



UPPER COOK INLET SALMON (Oncorhynchus spp.) ESCAPEMENT STUDIES, 1984

By:

Bruce E. King
and
Kenneth E. Tarbox

April 1987

ADF&G TECHNICAL DATA REPORTS

This series of reports is designed to facilitate prompt reporting of data from studies conducted by the Alaska Department of Fish and Game, especially studies which may be of direct and immediate interest to scientists of other agencies.

The primary purpose of these reports is presentation of data. Description of programs and data collection methods is included only to the extent required for interpretation of the data. Analysis is generally limited to that necessary for clarification of data collection methods and interpretation of the basic data. No attempt is made in these reports to present analysis of the data relative to its ultimate or intended use.

Data presented in these reports is intended to be final, however, some revisions may occasionally be necessary. Minor revision will be made via errata sheets. Major revisions will be made in the form of revised reports.

UPPER COOK INLET SALMON (*Oncorhynchus* spp.)

ESCAPEMENT STUDIES, 1984

by

Bruce E. King
Fisheries Biologist

and

Kenneth E. Tarbox
Fisheries Biologist

Alaska Department of Fish and Game
Division of Commercial Fisheries
Box 3150
Soldotna, Alaska 99669

April 1987

TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	i
LIST OF FIGURES	iv
LIST OF APPENDICES	vi
ABSTRACT	xi
INTRODUCTION	1
METHODS	6
RESULTS AND DISCUSSION	10
Kenai River	10
Kasilof River	24
Crescent River	36
Susitna River	41
Sockeye Salmon	41
Pink Salmon	51
Chum Salmon	56
Coho Salmon	56
Chinook Salmon	59
Evaluation of Data	59
Upper Cook Inlet Minor Systems	60
Big River	60
McArthur/Chakachatna River	60
Chuitna River	66
Fish Creek (Big Lake)	66
South Kenai Peninsula Streams	66
Packers Lake (Kalgin Island)	66
LITERATURE CITED	70
APPENDICES	74

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Estimated sockeye salmon escapement recorded by side scan sonar in the Kenai, Kasilof, Crescent, and Susitna Rivers, 1978-1984 . . .	11
2. Late run Kenai River sockeye salmon escapement summary, 1968-1984	12
3. Peak late run sockeye salmon escapement counts in eight index areas, Kenai River drainage, 1969-1984	13
4. Salmon escapement counts conducted on selected tributaries of the Kenai River, 1984	14
5. Bank distribution and timing of salmon escapement recorded by side scan sonar in the Kenai, Kasilof, Crescent, and Susitna Rivers, 1980-1984	15
6. Date of cumulative percent of late run sockeye salmon counts recorded in the Kenai River 1968-1984	20
7. Summary of tagged sockeye salmon movement patterns in the Kenai River, 1984	21
8. Comparison of four methods of determining age composition of sockeye salmon collected in the Kenai River, 1984	22
9. Age composition of sockeye salmon collected in the Kenai River, 1969-1984	23
10. Kasilof River sockeye salmon escapement summary, 1968-1984	25
11. Peak sockeye salmon escapement counts in index areas, Kasilof River drainage, 1975-1984	26
12. Distribution (percent) of sockeye salmon in the major index tributary systems of Tustumena Lake, 1975-1984	27
13. Mean residence time in Tustumena Lake of sockeye salmon bound for Glacier Flats and Bear Creek, 1984	28
14. Date of cumulative percent of sockeye salmon counts recorded in the Kasilof River, 1968-1984	31
15. Age composition of sockeye salmon collected in the Kasilof River, 1969-1984	34
16. Comparison of four methods of determining age composition of sockeye salmon collected in the Kasilof River, 1984	35

LIST OF TABLES (Continued)

<u>Table</u>	<u>Page</u>
17. Date of cumulative percent of sockeye salmon counts recorded in the Crescent River, 1979-1984	39
18. Age composition of sockeye salmon collected in the Crescent River, 1979-1984	42
19. Peak sockeye salmon escapement counts in Susitna River tributary index areas, 1973-1984	44
20. Salmon escapement counts in Susitna River tributaries, 1984 . . .	45
21. Date of cumulative percent of sockeye salmon counts recorded in the Susitna River at Susitna Station, 1978-1984	47
22. Comparison of two methods of determining age composition of sockeye salmon collected in the Susitna River at Susitna Station, 1984	52
23. Age composition of sockeye salmon collected in the Susitna River at Susitna Station, 1975-1984	53
24. Age composition of sockeye salmon collected in the Yentna River, 1984	54
25. Date of cumulative percent of pink salmon counts recorded in the Susitna River at Susitna Station, 1978-1984	55
26. Unweighted age composition of chum salmon collected in the Susitna River at Susitna Station, 1975-1984	57
27. Unweighted age composition of coho salmon collected in the Susitna River, 1975-1984	58
28. Salmon escapement observations in selected Upper Cook Inlet anadromous streams, 1984	62
29. Results of stream surveys conducted on sockeye salmon spawning tributaries of the Big River drainage, 1984	63
30. Age composition of sockeye salmon collected in Big River, 1982-1984	64
31. Results of stream surveys conducted on sockeye salmon spawning tributaries of the McArthur/Chakachatna Rivers drainage, 1984 . .	65
32. Age composition of sockeye salmon collected in the McArthur/Chakachatna River drainage, 1983-1984	67
33. Fish Creek sockeye salmon escapement, Big Lake drainage, 1936-1984	68

LIST OF TABLES (Continued)

<u>Table</u>	<u>Page</u>
34. Date of cumulative percent of sockeye salmon counts recorded in Fish Creek, 1980-1984	69

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Kenai River drainage and major sockeye salmon rearing lakes . . .	2
2. Kasilof River drainage and major sockeye salmon spawning and rearing areas	3
3. Crescent River drainage and major sockeye salmon rearing lake . .	4
4. Susitna River drainage and major tributary rivers	5
5. Kenai River side-scan sonar count sector distribution over time (grouped in five-day time periods), 11 June-8 August 1984	17
6. Kenai River side-scan sonar count hourly distribution over time (two-hour increments grouped in five-day time periods) 22 June-8 August 1984	18
7. Percent of total tags recovered by spawning area (grouped by date of tagging at the Kasilof River sonar site) expressed in the number of fish enumerated by sonar during each tagging period . .	29
8. Kasilof River side-scan sonar count sector distribution over time (grouped in five-day time periods), 10 June-31 July 1984	32
9. Kasilof River side-scan sonar count hourly distribution over time (two-hour increments grouped in five-day time periods), 10 June-31 July 1984	33
10. Crescent River side-scan sonar count sector distribution over time (grouped in four-day time periods), 15 June-31 July 1984 . .	37
11. Crescent River side-scan sonar count hourly distribution over time (two-hour increments grouped in four-day time periods), 15 June - 31 July 1984	38
12. Daily sockeye salmon escapement into the Crescent River and commercial catch of sockeye salmon in the Western Subdistrict of Upper Cook Inlet, 1984	40
13. Susitna River (Susitna Station) east bank side-scan sonar count hourly (two-hour increments) and sector distribution over time, 1 July-8 August 1984 (data grouped in four-day time periods) . .	48
14. Yentna River side-scan sonar count hourly distribution over time (two-hour increments grouped in six-day time periods), 1 July-4 September 1984	49
15. Yentna River side-scan sonar count sector distribution over time (grouped in six-day time periods), 1 July-4 September 1984 . . .	50

LIST OF FIGURES (Continued)

<u>Figure</u>	<u>Page</u>
16. Anadromous streams of Upper Cook Inlet, Alaska	5

LIST OF APPENDICES

<u>Appendix</u> <u>Table</u>	<u>Page</u>
1. Total number of fish targets and estimated species composition recorded by side scan sonar in the Kenai River, 22 June through 8 August 1984	75
2. Kenai River south bank side-scan sonar counts by sector, 22 June through 8 August 1984	77
3. Kenai River south bank side-scan sonar counts by sector, five day time periods, 22 June through 8 August 1984	79
4. Kenai River north bank side-scan sonar counts by sector, five day time periods, 22 June through 8 August 1984	80
5. Kenai River north bank side-scan sonar counts by sector, five day time periods, 22 June through 8 August 1984	82
6. Fish target observations inside and outside of the 18 m counting range of the Bendix side-scanning sonar in the Kenai River, 19 July through 30 July 1984	83
7. Kenai River north bank side-scan sonar counts by hour, 22 June through 8 August 1984	86
8. Kenai River north bank side-scan sonar counts by hour, five day time periods, 22 June through 8 August 1984	87
9. Kenai River south bank side-scan sonar counts by hour, 22 June through 8 August 1984	88
10. Kenai River south bank side-scan sonar counts by hour, five day time periods, 22 June through 8 August 1984	89
11. Total number of fish targets and estimated species composition recorded by north bank sonar in the Kenai River, 22 June through 8 August 1984	90
12. Total number of fish targets and estimated species composition recorded by south bank sonar in the Kenai River, 22 June through 8 August 1984	92
13. Summary of Kenai River sonar site tagged sockeye salmon recoveries, 1984	94
14. Daily fishwheel catch by species on the north bank of the Kenai River, 27 June through 8 August 1984	97
15. Daily fishwheel catch by species on the south bank of the Kenai River, 22 June through 8 August 1984	99

LIST OF APPENDICES (Continued)

<u>Appendix Table</u>	<u>Page</u>
16. Length composition of the major age classes of sockeye salmon collected in the Kenai River, 1976-1984	101
17. Weight composition of the major age classes of sockeye salmon collected in the Kenai River, 1981-1984	103
18. Total number of fish targets and estimated species composition recorded by side-scan sonar in the Kasilof River, 10 June through 31 July 1984	104
19. Summary of Kasilof sonar site tagged sockeye salmon recoveries, 1984	106
20. Total number of fish targets and estimated species composition recorded by north bank sonar in the Kasilof River, 10 June through 31 July 1984	116
21. Total number of fish targets and estimated species composition recorded by south bank sonar in the Kasilof River, 10 June through 31 July 1984	118
22. Kasilof River north bank side-scan sonar counts by sector, 10 June through 31 July 1984	120
23. Kasilof River north bank side-scan sonar counts by sector, five day time periods, 10 June through 31 July 1984	123
24. Kasilof River south bank side-scan sonar counts by sector, 10 June through 31 July 1984	124
25. Kasilof River south bank side-scan sonar counts by sector, five day time periods, 10 June through 31 July 1984	127
26. Kasilof River north bank side-scan sonar counts by hour, 10 June through 31 July 1984	128
27. Kasilof River north bank side-scan sonar counts by hour, five day time periods, 10 June through 31 July 1984	129
28. Kasilof River south bank side-scan sonar counts by hour, 10 June through 31 July 1984	130
29. Kasilof River south bank side-scan sonar counts by hour, five day time periods, 10 June through 31 July 1984	131
30. Daily fishwheel catch by species on the north bank of the Kasilof River bridge, 18 June through 27 July 1984	132

LIST OF APPENDICES (Continued)

<u>Appendix Table</u>	<u>Page</u>
31. Daily fishwheel catch by species on the south bank of the Kasilof River, 17 June through 27 July 1984	134
32. Length composition of the major age classes of sockeye salmon collected in the Kasilof River, 1976-1984	136
33. Weight composition of the major age classes of sockeye salmon collected in the Kasilof River, 1981-1984	138
34. Total number of fish targets and estimated species composition recorded by side-scan sonar in the Crescent River, 15 June through 31 July 1984	139
35. Crescent River north bank side-scan sonar counts by sector, 17 June through 31 July 1984	141
36. Crescent River north bank side-scan sonar counts by sector, four day time periods, 17 June through 31 July 1984	143
37. Crescent River south bank side-scan sonar counts by sector, 15 June through 31 July 1984	144
38. Crescent River south bank side-scan sonar counts by sector, four day time periods, 15 June through 31 July 1984	146
39. Crescent River north bank side-scan sonar counts by hour, 17 June through 21 July 1984	147
40. Crescent River north bank side-scan sonar counts by hour, four day time periods, 17 June through 31 July 1984	148
41. Crescent River south bank side-scan sonar counts by hour, 15 June through 31 July 1984	149
42. Crescent River south bank side-scan sonar counts by hour, four day time periods, 17 June through 31 July 1984	150
43. Total number of fish targets and estimated species composition recorded by north bank sonar in the Crescent River, 15 June through 31 July 1984	151
44. Total number of fish targets and estimated species composition recorded by south bank sonar in the Crescent River, 15 June through 31 July 1984	153
45. Length composition of the major age classes of sockeye salmon collected in the Crescent River, 1979-1984	155

LIST OF APPENDICES (Continued)

<u>Appendix Table</u>	<u>Page</u>
46. Weight composition of the major age classes of sockeye salmon collected in the Crescent River, 1980-1984	157
47. Daily hook and release catch and seine catch from Crescent River, 21 July through 31 July 1984	158
48. Total number of fish targets and estimated species composition recorded by side-scan sonar on the east bank of the Susitna River at Susitna Station, 1 July through 8 August 1984	160
49. Total number of fish targets and estimated species composition recorded by side scan sonar species composition recorded by side scan sonar in the Yentna River at Yentna Station, 1 July through 5 September 1984	162
50. Apportioned sonar counts and Petersen population (tag-recapture) estimates by species and sampling location, Adult Anadromous Investigations, Susitna Hydroelectric Studies, 1984	165
51. Daily fishwheel catch by species on the east bank of the Susitna River at Susitna Sation, 1 July through 8 August 1984	166
52. Susitna River (Susitna Station) east bank side-scan sonar counts by sector, 1 July through 8 August 1984	168
53. Susitna River (Susitna Station) east bank side-scan sonar counts by sector, four day time periods, 1 July through 8 August 1984 .	170
54. Fish target observations inside and outside of the 18 m counting range of the Bendix side-scanning sonar in the Susitna River, 9 July through 8 August 1984	171
55. Susitna River (Susitna Station) east bank side-scan sonar counts by hour, 1 July through 8 August 1984	173
56. Susitna River (Susitna Station) east bank side-scan sonar counts by hour, four day time periods, 1 July through 8 August 1984 . .	174
57. Yentna River (Yentna Station) north bank side-scan sonar counts by hour, 1 July through 4 September 1984	175
58. Yentna River (Yentna Station) north bank side-scan sonar counts by hour, six day time periods, 1 July through 4 September 1984 .	176
59. Yentna River (Yentna Station) south bank side-scan sonar counts by hour, 1 July through 4 September 1984	177
60. Yentna River (Yentna Station) south bank side-scan sonar counts by hour, six day time periods, 1 July through 4 September 1984 .	178

LIST OF APPENDICES (Continued)

<u>Appendix Table</u>	<u>Page</u>
61. Yentna River (Yentna Station) north bank side-scan sonar counts by sector, 1 July through 8 September 1984	179
62. Yentna River (Yentna Station) north bank side-scan sonar counts by sector, six day time periods, 1 July through 8 September 1984	182
63. Yentna River (Yentna Station) south bank side-scan sonar counts by sector, 1 July through 8 September 1984	183
64. Yentna River (Yentna Station) south bank side-scan sonar counts by sector, six day time periods, 1 July through 8 September 1984	186
65. Length composition of the major age classes of sockeye salmon collected in the Susitna River at Susitna Station, 1979-1984 . . .	187
66. Weight composition of the major age classes of sockeye salmon collected in the Susitna River at Susitna Station 1979-1984 . . .	189
67. Length composition from pink salmon collected in the Susitna River at Susitna Station, 1976-1984	190
68. Weight composition from pink salmon collected in the Susitna River at Susitna Station, 1976-1984	191
69. Length composition from the major age classes of chum salmon collected in the Susitna River at Susitna Station, 1975-1984 . . .	192
70. Weight composition from the major age classes of chum salmon collected in the Susitna River at Susitna Station, 1980-1984 . . .	194
71. Length composition from the major age classes of coho salmon collected in the Susitna River, 1976-1984	195
72. Weight composition from the major age classes of coho salmon collected in the Susitna River, 1979-1984	196
73. Fish Creek (Big Lake) weir counts by date and species, 29 June through 19 September 1984	197
74. Fish Creek (Big Lake) escapement of sockeye salmon, age, length (mm) and weight (kg) by sex, 1984	200

ABSTRACT

Sockeye salmon (*Oncorhynchus nerka*) 1984 escapements into the four major river systems of Upper Cook Inlet, Alaska were estimated by hydroacoustic and other techniques. Escapements totaled 344,571 fish into the Kenai River, 231,685 fish into the Kasilof River, 118,345 fish into the Crescent River, and 194,480-279,446 fish into the Susitna River. Escapements of chum salmon (*O. keta*), coho salmon (*O. kisutch*), pink salmon (*O. gorbuscha*), and chinook salmon (*O. tshawytscha*) into the Susitna River were also documented from various sources. Estimates derived by a combination of sonar and mark-recapture techniques were 746,724-1,017,022 pink salmon, 764,958 chum salmon, 190,061 coho salmon, and 121,724 chinook salmon. Age, sex, length, and weight data for the above salmon species are also presented. In addition, sockeye salmon migratory behavior data in the form of spatial and temporal distribution and migratory timing information are given. Finally, escapement information for Upper Cook Inlet streams compiled by other Alaska Department of Fish and Game divisions, state and federal agencies, private consultants, and nonprofit corporations are documented.

KEY WORDS: Pacific salmon escapements, hydroacoustic enumeration, biological sampling, migratory behavior.

INTRODUCTION

In 1984 sockeye salmon (*Oncorhynchus nerka*) escapements were monitored daily by the Alaska Department of Fish and Game (ADF&G) in the Kenai, Kasilof, Crescent, and Susitna River drainages of Upper Cook Inlet (Figures 1 through 4). Pink salmon (*O. gorbuscha*), chum salmon (*O. keta*), and coho salmon (*O. kisutch*) escapements into the Susitna River were also monitored during the sockeye salmon run.

A description of the Upper Cook Inlet (UCI) management area and its major sockeye salmon producing rivers is presented by Tarbox et al. (1983). Historical information on escapement enumeration efforts can be found in Waltemyer et al. (1980).

The objectives of Upper Cook Inlet escapement research projects conducted by the Commercial Fisheries Division on the Kenai, Kasilof, Susitna, and Crescent Rivers in 1984 were to estimate:

- 1) the magnitude of escapement and migration timing of sockeye salmon in the mainstem river;
- 2) the age, weight, length (AWL), and sex characteristics of the sockeye salmon escapement; and
- 3) the magnitude, timing, and distribution of spawning sockeye salmon within established tributary index areas (excluding Crescent River).

Secondary objectives for the Susitna River project were to assess:

- 1) the relative magnitude of escapement of coho salmon, chum salmon, and pink salmon in the mainstem river; and
- 2) the age, weight, length, and sex characteristics of coho salmon, chum salmon, and pink salmon escapements.

Sockeye salmon age composition analysis included an assessment of the adequacy of sample size requirements relative to weighting of age class proportions by numbers in the escapement. This was the second year of a three year study to determine the most appropriate and cost effective age composition sampling scheme for the Kenai, Kasilof, and Susitna River sockeye salmon escapements.

The collection of migratory behavior information on the Kasilof and Kenai River sockeye salmon escapements was facilitated by tagging a small percentage of fish captured in the fishwheels. Tag recovery information was used to determine timing of individual tributary stocks at the sonar site, and rate of travel to the spawning grounds.

An additional objective was to document salmon research conducted on major tributaries of the Kenai, Kasilof, Susitna, and Crescent River drainages as well as other systems in the UCI area. This includes programs instituted by the Division of Commercial Fisheries to estimate the magnitude and age composition of sockeye salmon escapement in the Big River and

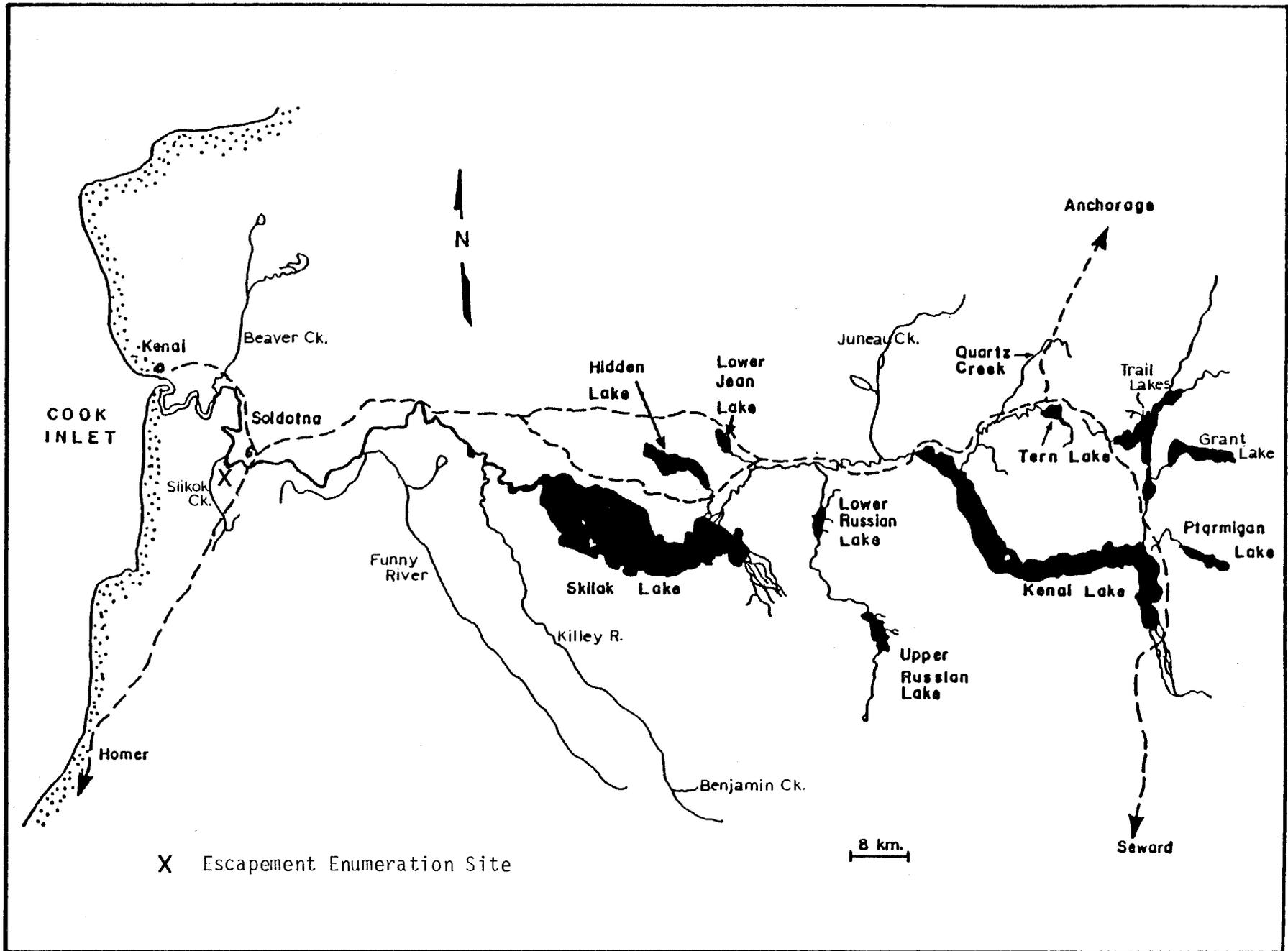


Figure 1. Kenai River drainage and major sockeye salmon rearing lakes.

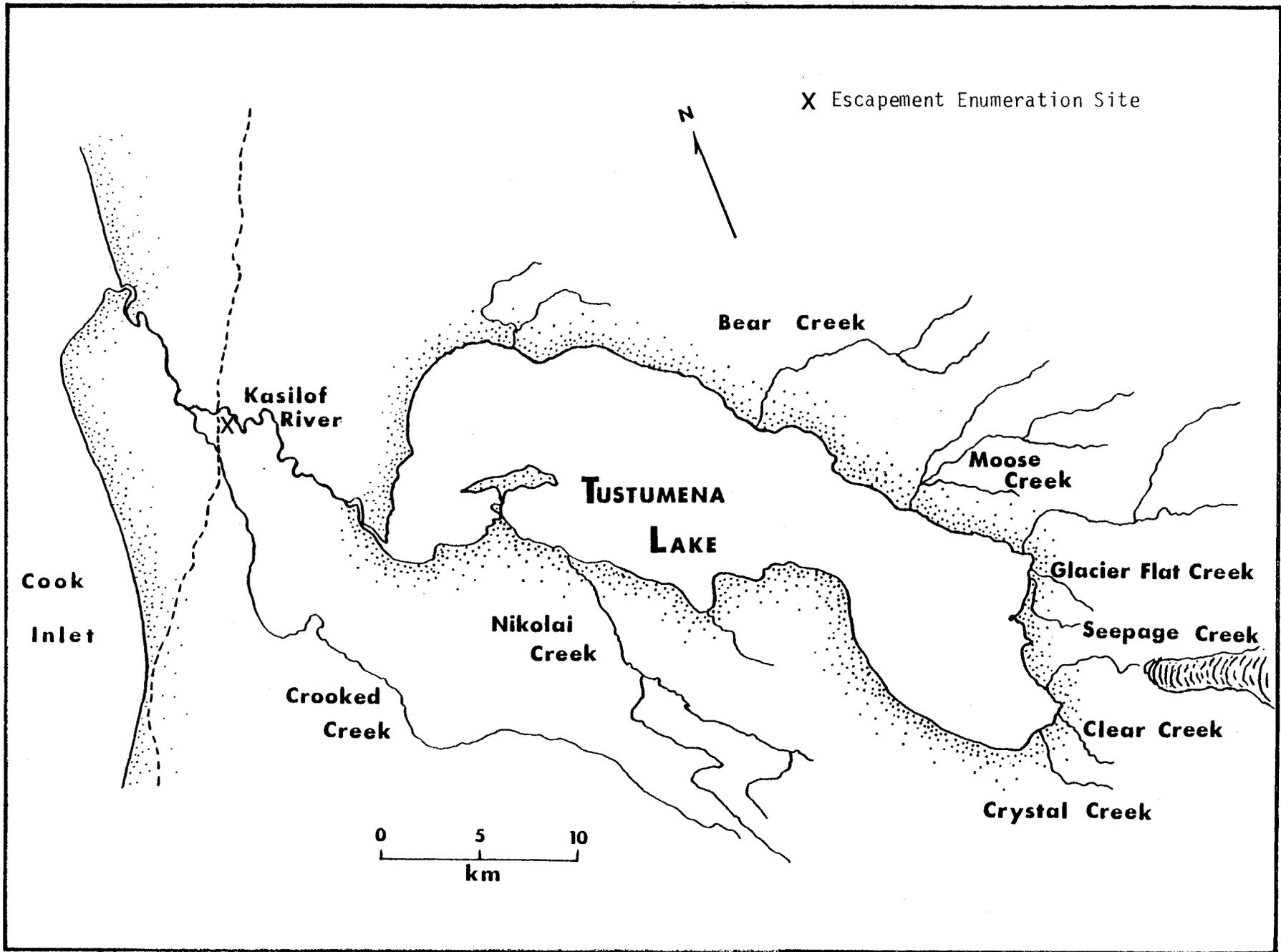


Figure 2. Kasilof River drainage and major sockeye salmon spawning and rearing areas.

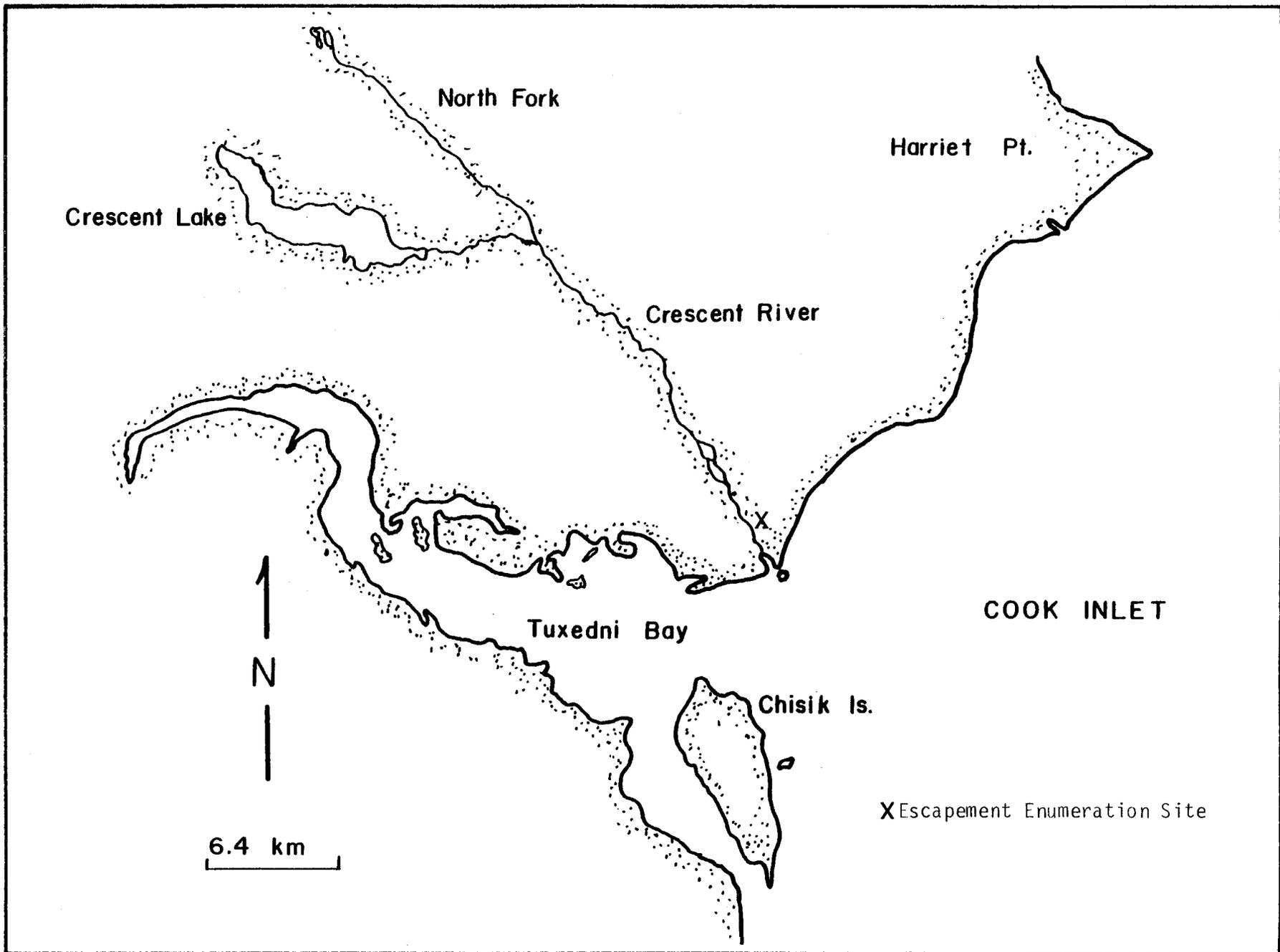


Figure 3. Crescent River drainage and major sockeye salmon rearing lake.

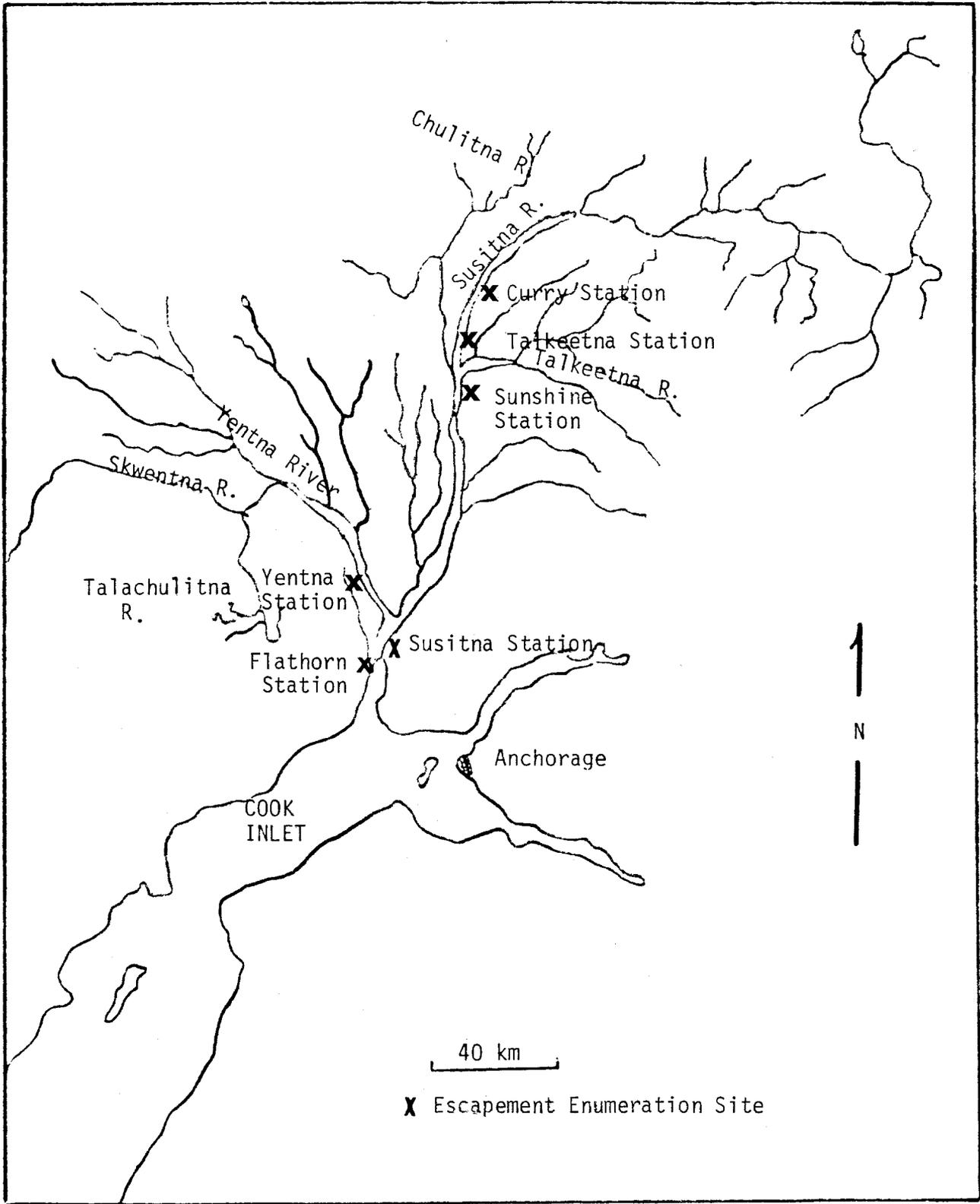


Figure 4. Susitna River drainage and major tributary rivers.

McArthur/Chakachatna River drainages. Population estimates or peak counts of salmon in UCI streams made by other ADF&G divisions, state and federal agencies, private consultants, and nonprofit corporations were summarized and presented when available.

METHODS

Since the early 1960's, the ADF&G has contracted the Bendix Corporation to develop sonar equipment to count the number of sockeye salmon migrating to spawning grounds in the major rivers of the Cook Inlet area. Glacial silt in these rivers severely limits less expensive visual means of escapement assessment. This development has resulted in the installation of Bendix side-scanning sonar counts in the Kenai, Kasilof, Susitna, and Crescent Rivers.

Procedures for deployment, operation, and calibration of side-scan sonar equipment are summarized by Tarbox et al. (1983). However, the normal procedure of operating individual counters on opposite sides of the river and in close proximity to each other was abandoned at Susitna Station in 1984 because of the lack of a suitable site on the west bank of the river (King and Tarbox 1984). Escapement estimates for 1984 consisted of apportioned sonar counts from the east bank of the river at Susitna Station, apportioned sonar counts from Yentna Station, and mark/recapture estimates derived for Flathorn and Sunshine Stations (Barrett et al. 1985).

Additional changes in research project operations in 1984 included moving the Crescent River salmon enumeration project from the outlet of Crescent Lake to a section of the lower river approximately one and one-half miles from its terminus at Cook Inlet. The primary purpose of the move was to provide timely escapement estimates necessary for more precise management of the Western Subdistrict commercial fishery. Problems associated with the Crescent Lake outlet site relative to fishery management are discussed in Tarbox et al. (1983). Analysis of migratory behavior and timing data in this report reflects this change in site location.

In 1984 an effort was made to determine the degree of migration outside the normal side-scan sonar counting range (18 m) on the north bank of the Kenai River, and east bank of the Susitna River. To accomplish this, the counting range was extended to 24 m and a ratio of counts inside 18 m to counts inside 24 m was generated. This ratio was then applied to the hourly or daily sonar count to more accurately estimate the daily escapement. A minimum of four observations of five minutes or longer were conducted daily. Kenai River north bank sonar counts were adjusted from 19 July through 29 July. Since the degree of offshore distribution in the Kenai River varied throughout the day, observations were scheduled at regular intervals and, for those time blocks when outside distribution was observed, each hourly count was adjusted by the ratio established in the most recent observation period. Susitna River east bank sonar counts were adjusted from 9 July through 8 August. Data from observations were summed on a daily basis and a single ratio based on all observations was applied to the daily count.

Field enumeration activities in 1984 began and ended on the following dates:

Kenai River - 22 June to 8 August
Kasilof River - 10 June to 31 July
Susitna River - 1 July to 8 August
Crescent River - 15 June to 31 July

Estimates of escapement into the Kasilof and Kenai Rivers prior to and after termination of hydroacoustic activities were generated by fitting seasonal daily escapement proportions to the historic migratory timing profile developed during years when sonar operations were maintained throughout the run. An estimate of sockeye salmon escapement into Crescent River after 31 July was derived using the exploitation rate of the Western Subdistrict set gillnet fishery from 31 July through 20 August.

Fishwheels were installed at the Kenai, Kasilof, and Susitna River sites to assess migration timing, provide relative salmon species abundance data for apportionment of sonar counts, and obtain age, weight, length, and sex composition (AWL) samples. To derive species apportionment of sonar counts, daily fishwheel catches were grouped into samples of at least 150 salmon. The daily sonar count was then multiplied by the relative abundance of each species captured by the fishwheels to estimate the apportioned sonar count by species. Sonar counts enumerated in Crescent River were apportioned daily (after 21 July) based on lower river hook and release (snagging) catch. AWL information for Crescent River stocks was obtained from fish taken by beach seine operated in Crescent Lake.

The AWL data obtained from each salmon species were as follows.

- 1) Chum and coho salmon. Age (scale), weight, length (mid-eye to fork of tail), and sex composition data were collected from all adults captured.
- 2) Pink salmon. A minimum of 10 weight, length, and sex composition samples were collected daily.
- 3) Sockeye salmon. Length and weight data from sockeye salmon were limited to approximately 600 samples per river. Generally, all fish captured were sampled until this level was achieved, under the assumption that lengths and weights by age class and sex do not change significantly through time. All fish captured during the season were examined for sex related characteristics and sex ratios were determined by grouping all samples together regardless of timing of sampling.

Scales were taken from the first 300 adults captured to provide "known" growth pattern samples for the stock separation catch allocation program (Cross, pers. comm.). The sockeye salmon age composition (scale) sampling program was then altered in an attempt to determine the degree of season variation in age composition occurring the Kenai, Kasilof, and Susitna Rivers. This was accomplished by breaking the escapement by river into several periods and weighting the age composition within each period by the apportioned sonar count obtained during the period. These data were

then recombined to derive a weighted total season age composition which was compared to the age composition derived by grouping all samples together. For each method, the number of fish (E.j), standard deviation (Etj), and confidence interval (CI of each major age class were calculated using the following formulae (Cochran 1977).

$$Etj = Et * Ptj$$

$$V[Etj] = (Et)^2 \frac{Ptj(1-Ptj)}{Nt - 1}$$

$$E.j = \sum_{t=1}^T Etj$$

$$V[E.j] = \sum_{t=1}^T V[Etj]$$

Et = Estimated number of fish escaping during stratum t.
Ptj = Proportion of the sample taken during stratum t that is age j.
Nt = Sample size for stratum t.
Etj = Estimated number of fish of age j escaping during stratum t.
T = Number of strata.
E.j = Estimated number of fish age j escaping during the season.

$$CI = +/- V[E.j] * t(\alpha=0.05, n-1 \text{ d.f.})$$

Data were then formatted in a contingency table using number of fish by age class (R) by sampling period (C) for the method selected. A Chi-square test was then performed on the data set to determine if the numbers of fish by age class was independent of time of sampling (H₀). If the null hypothesis was rejected (an indication of differences in age class frequency by period), then the Chi-square test was repeated between periods to determine when changes in age composition occurred.

Bernard (1983) outlined the necessary sample sizes to simultaneously estimate the true proportion of each major age group in the escapement within 5 percentage points 90% of the time. The sample sizes presented below are maximum numbers of samples necessary to meet the above precision level and are based on historical age composition data. Because of the degree of variation in the proportion of the dominant age class in historical data, the maximum sample level was selected for the Kasilof and Susitna Rivers. Since "ideal" sample levels are based on historic information, failure to obtain the level does not necessarily reduce precision. Sample size adequacy was evaluated after age class proportions and number of age classes was known. Essentially, it was decided to obtain as many samples as possible every three to four days within the following limits:

Kenai River. The first day after sonar counts reach 10,000 per day, we attempted to sample up to 500 fish in a 24-hour period. Sampling was continued at this level until sonar counts dropped below 10,000 per day.

Kasilof River. All fish captured (up to 640) were sampled in a 24-hour period.

Susitna River. The first day after apportioned sockeye salmon sonar counts reach 10,000 per day, up to 640 fish were sampled in a 24-hour period. This sampling schedule was continued until counts dropped below 10,000 per day.

Periods for weighting were established post-season and age composition was derived in one of four ways.

Method I - All samples were combined into one period (unweighted age composition).

Method II - Three to four periods of roughly equal escapement were determined and an age composition derived based on all samples taken within that period. The data was recombined to get a total weighted age composition.

Method III - Samples from one or more dates (but not all) were used within each period to derive the age composition for that period and the period totals were recombined to get a total weighted age composition.

Method IV - Forty samples per day within each period were used to derive the age composition for that period, and the period totals were recombined to get a total weighted age composition. This analysis was included to provide some perspective on historical sampling levels (Tarbox et al. 1983). Cases where more than one date per period was used (Methods II and III) resulted when the desired sample size was not achieved in 24 hours.

A proportion of sockeye salmon captured by fishwheel in the Kenai and Kasilof Rivers were marked prior to release with Floy spaghetti tags. In an effort to minimize handling stress on tagged fish, no AWL information was taken during the tagging process. In addition, fish were not allowed to accumulate in fishwheel liveboxes overnight prior to tagging days. Recapture techniques included weir operations on selected tributaries, spawning ground surveys, and returns from the sport and commercial fisheries.

Index-area escapement surveys were conducted by staff personnel on the Kenai, Kasilof, and Susitna Rivers, and various minor Northern District river systems. A combination of helicopter, fixed wing aircraft, and foot surveys were conducted from 1 August to 5 September. These surveys have been conducted annually to obtain an indication of spawner distribution and relative escapement magnitude within tributaries. Index area counts, and other survey data documented in this report represent peak live and dead counts. Data from non-peak surveys are stored in Commercial Fisheries Division stream survey files in Soldotna.

Migratory behavior of sockeye salmon at the sonar site was assessed by analysis of distribution from shore (expressed in percentage of targets by counting sector), hourly distribution, bank preference for travel, cumulative percentage of sonar counts by day (migratory timing), and tag recovery information.

Migratory behavior data (side-scan sector and hourly distribution of counts) were analyzed over time using analysis and plotting programs described in Roberson et al. (1982). Migratory timing data were based on apportioned sonar counts.

RESULTS AND DISCUSSION

The following escapement data are presented by drainage. Factors affecting accuracy of counts, and sources of mortality above the sonar site (notably the sport fishing harvest) are presented where known.

Kenai River

During the period of 22 June through 8 August 1984, 352,701 fish targets were enumerated in the Kenai River (Appendix Table 1). The apportioned sockeye salmon total of 333,914 was expanded to 344,571 to account for fish passing the sonar site after 8 August (Table 1). This was the lowest estimated sockeye salmon escapement since 1979, and represented approximately 98% of the minimum escapement goal of 350,000 fish. The estimated number of potential spawners (sonar count minus sport harvest above the Soldotna bridge) was 307,801 fish (Table 2).

Individual tributary escapement estimates and sources of data are presented in Tables 3 and 4. Record numbers of fish were enumerated in Ptarmigan Creek, Hidden Lake, and Russian River. Peak counts for all tributaries contributed to an index area escapement total which exceeded any year on record, and represented a minimum of 62% of the estimated spawners in the drainage.

As in the previous two years, the degree of bank orientation exhibited by sockeye salmon changed as the season progressed. Fish migrating up the south bank followed the historic pattern of moving closer to shore as passage rate increased (Figure 5 and Appendix Tables 2 and 3). North bank fish also exhibited this pattern during the first half of the escapement, however, distribution was relatively even across the substrate for the period 22 through 26 July when approximately 37% of the total fish targets were enumerated (Figure 5 and Appendix Tables 4 and 5). Extension of the counting range beyond the normal operating distance indicated fish were migrating in the area immediately beyond the offshore end of the substrate. Adjustment of daily sonar counts by the ratio of counts within 18 m to counts within 24 m (Appendix Table 6) increased north bank total fish targets for the season by 7.5%. Hourly distribution of fish targets was concentrated between 1700 hr and 0400 hr on both banks during the peak of the run (Figure 6 and Appendix Tables 7 through 10). Sixty-five percent of the recorded fish targets were counted on the north bank in 1984 (Table 5). Peak sockeye salmon passage date preceded the midpoint of the run by four days, three days, and four

Table 1. Estimated sockeye salmon escapement recorded by side scan sonar in the Kenai, Kasilof, Crescent, and Susitna Rivers, 1978-1984.

Year	System			
	Kenai R. ^{1/}	Kasilof R.	Crescent R.	Susitna R. ^{2/}
1978	398,900	116,600	<u>3/</u>	94,400
1979	285,020	152,179 ^{4/}	86,654	156,890
1980	464,038	187,154 ^{4/}	90,863	190,866
1981	407,639	256,625 ^{4/}	41,213	340,232
1982	619,831	180,239 ^{4/}	58,957	215,856 ^{5/} - 265,332 ^{6/}
1983	630,340	210,271 ^{4/}	92,343	112,314 - 175,936 ^{6/}
1984	344,571	231,685 ^{4/}	118,345	194,480 ^{5/} - 279,446 ^{6/}

^{1/} Includes counts after 21 June only.

^{2/} Apportioned sonar counts from Susitna Station unless otherwise indicated.

^{3/} No counts conducted.

^{4/} Includes counts or estimates from designated early period (prior to 15 June).

^{5/} Apportioned sonar counts from Yentna Station and Susitna Station east bank.

^{6/} Apportioned sonar count from Yentna Station and mark/recapture estimate from Sunshine Station.

Table 2. Late run Kenai River sockeye salmon escapement summary, 1968-1984.

Year	Sonar Count ^{1/}	Russian River Sport Harvest ^{2/}	Kenai River Mainstem Sport Harvest ^{3/}	Estimated Total Harvest Above Sonar Site ^{4/}	Sonar Count Less Sport Harvest ^{5/}
1968	88,000	5,820			
1969	53,000	1,150			
1970	73,000	600			
1971	--	10,730			
1972	318,000	16,050			
1973	367,000	8,930			
1974	161,000	8,500	8,030	16,530 ^{6/}	144,470
1975	142,000	8,390	5,110	13,500 ^{6/}	128,500
1976	380,000	13,700	13,140	26,840 ^{6/}	353,160
1977	708,000	27,440	16,933	44,373 ^{6/}	663,627
1978	398,900	24,530	24,542	49,072 ^{6/}	349,828
1979	285,020	26,830	12,328	39,158 ^{6/}	245,862
1980	464,038	33,490	18,592	52,082 ^{6/}	411,956
1981	407,639	23,720	14,451	38,171	369,468
1982	619,831	10,321	38,397	48,718	571,113
1983	630,340	16,000	48,306	64,306	560,034
1984	344,571	21,970	14,800	36,770 ^{7/}	307,801

^{1/} Multiple transducer sonar 1968-1977, side scan sonar 1978-1984.

^{2/} Nelson (1985).

^{3/} Data from Sport Fish Division Statewide Harvest Estimate. Includes harvest above the Soldotna bridge (and sonar site) only.

^{4/} Total of Russian River sport harvest and Kenai River mainstem harvest above the Soldotna bridge.

^{5/} Considered estimate of spawners above the sonar site.

^{6/} Cross et al. 1983.

^{7/} Preliminary.

Table 3. Peak late run sockeye salmon escapement counts in eight index areas, Kenai River drainage, 1969-1984.

Year	Railroad Creek	Johnson Creek	Carter- Moose Creek	Ptarmigan Creek	Tern (Mud) Lake	Quartz Creek	Hidden Lake	Russian River ^{1/}	Total Index Area Escapement ^{2/}
1969	100	75	598	5	487	487	500	30,020	32,200
1970	99	118	348	7	561	200	323	28,420	30,100
1971	194	160	3,201	45	1,370	808	1,958 ^{4/}	64,430	72,200
1972	700	150	3,400	(400) ^{3/}	1,200	(2,000) ^{3/}	4,956 ^{4/}	85,000	97,900
1973	521	1,714	660	1,041	1,731	3,173	690 ^{4/}	31,660	41,200
1974	3	46	939	558	(700) ^{3/}	255	1,150	26,860	30,600
1975	522	105	1,278	186	1,214	1,068	1,375	32,660	38,400
1976	1,032	(800) ^{3/}	5,558	(500) ^{3/}	1,548	3,372	4,860 ^{4/}	35,420	53,100
1977	1,262	450	6,515	1,513	2,230	3,037	1,055 ^{4/}	38,500	54,600
1978	1,749	780	1,933	3,529	1,126	10,627	4,647 ^{4/}	52,560	76,900
1979	--	588	3,986	523	1,693	277	5,762 ^{4/}	91,840	104,700
1980	1,259	253	4,879	5,752	2,575	7,982	27,448 ^{4/}	87,200	137,300
1981	1,276	142	4,370	1,421	3,402	5,998	15,939 ^{4/}	48,690	81,200
1982	2,518	498	4,752	7,525	4,300	70,540 ^{4/}	8,648 ^{4/}	75,630	174,400
1983	1,289	338	1,819	9,709	5/	73,345 ^{4/}	11,297 ^{4/}	78,000	176,400
1984	2,090 ^{6/}	939 ^{6/}	5,927 ^{6/}	18,000 ^{6/}	2,728 ^{4/}	37,659 ^{4/}	27,792 ^{4/}	95,660	190,800

^{1/} Includes total weir counts of fish entering Lower Russian Lake and peak count of escapement below falls.

^{2/} Total of individual counts rounded to the nearest hundred fish.

^{3/} Actual data not available. Average contribution to the total index for years 1968, 1970, 1971, 1973, 1975, and 1977 used to estimate the escapement.

^{4/} F.R.E.D. Division weir count.

^{5/} No counts conducted.

^{6/} Ralph Browning, pers. comm.

Table 4. Salmon escapement counts conducted on selected tributaries of the Kenai River, 1984.

Tributary	Method	Peak Count				
		Sockeye	Pink	Coho	Chum	Chinook
Russian River	Weir	28,910 ^{1/}		4,000		390 ^{2/}
Quartz Creek ^{2/}	Weir	37,659	some	3,600	some	497
Crescent Creek ^{2/}	Stream Count	28				82
Ptarmigan Creek ^{3/}	Stream Count	18,000				8
Grant Creek ^{3/}	Stream Count	263				27
Juneau Creek ^{2/}	Stream Count					74
Benjamin Creek ^{4/}	Stream Count					564
Moose Creek ^{5/}	Stream Count					3

^{1/} Early run only. Counted from 9 June through 16 July (Nelson 1985).

^{2/} Flagg 1984.

^{3/} Browning, pers. comm.

^{4/} Hammarstrom et al. 1985.

^{5/} Jack Dean, pers. comm.

Table 5. Bank distribution and timing of salmon escapement recorded by side scan sonar in the Kenai, Kasilof, Crescent, and Susitna Rivers, 1980-1984^{1/}.

Site-Species Bank	Percent of Total Fish Targets					Fifty Percent Passage Date				
	1980	1981	1982	1983	1984	1980	1981	1982	1983	1984
Kenai R. Sockeye										
North Bank	61	72	39	42	65	7/18	7/14	7/20	7/19	7/21
South Bank	39	28	61	58	35	7/19	7/19	7/21	7/19	7/23
Both Banks						7/18	7/14	7/21	7/19	7/22
Kasilof R. Sockeye										
North Bank	52	69	73	51	56	7/17	7/04	7/19	7/15	7/10
South Bank	48	31	27	49	44	7/16	7/02	7/18	7/17	7/17
Both Banks						7/16	7/04	7/19	7/16	7/15
Crescent R. Sockeye										
North Bank	49	57	54	39	71	7/22	7/20	7/21	7/18	7/17
South Bank	51	43	46	61	29	7/22	7/20	7/21	7/19	7/15
Both Banks						7/22	7/20	7/21	7/19	7/17
Susitna R. Sockeye ^{3/}										
East Bank	18	51	<u>2/</u>	17	25	7/22	7/20	7/27	7/19	7/19
West Bank	82	49	<u>2/</u>	83	75 ^{5/}	7/22	7/15	<u>2/</u>	7/20	<u>5/</u>
Both Banks						7/22	7/17	<u>2/</u>	7/20	
Susitna R. Pink ^{3/}										
East Bank	71	92	<u>2/</u>	80	57	7/30	7/24	7/29	7/24	7/29
West Bank	29	8	<u>2/</u>	20	49 ^{5/}	8/02	7/28	<u>2/</u>	7/27	<u>5/</u>
Both Banks						7/30	7/23	<u>2/</u>	7/24	
Susitna R. Chum ^{3/}										
East Bank	79	91	<u>2/</u>	72	60	7/29	7/26	7/30	<u>4/</u>	<u>4/</u>
West Bank	21	9	<u>2/</u>	18	40 ^{5/}	8/12	8/16	<u>2/</u>	<u>4/</u>	<u>5/</u>
Both Banks						7/30	7/27	<u>2/</u>	<u>4/</u>	
Susitna R. Coho ^{3/}										
East Bank	29	70	<u>2/</u>	31	55	7/30	7/27	7/30	<u>4/</u>	<u>4/</u>
West Bank	71	30	<u>2/</u>	69	45 ^{5/}	8/02	8/07	<u>2/</u>	<u>4/</u>	<u>5/</u>
Both Banks						8/02	7/28	<u>2/</u>	<u>4/</u>	

-Continued-

Table 5. Bank distribution and timing of salmon escapement recorded by side scan sonar in the Kenai, Kasilof, Crescent, and Susitna Rivers, 1980-1984^{1/} (continued).

- 1/ Based on estimated run timing when counters removed prior to end of sockeye run (Note: counters operated through 8 August only at Susitna Station in 1984).
- 2/ Mid-season data loss prevented determination of bank distribution and timing.
- 3/ Data from Susitna Station only.
- 4/ Migration timing data not available due to early (8 August) cessation of enumeration activities.
- 5/ No enumeration activities.

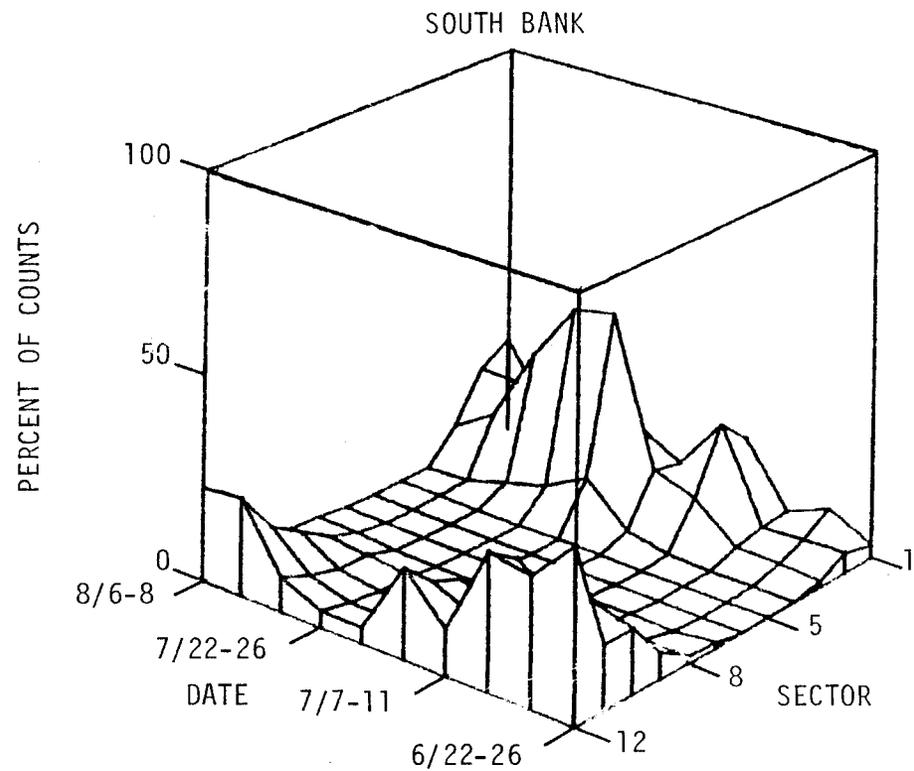
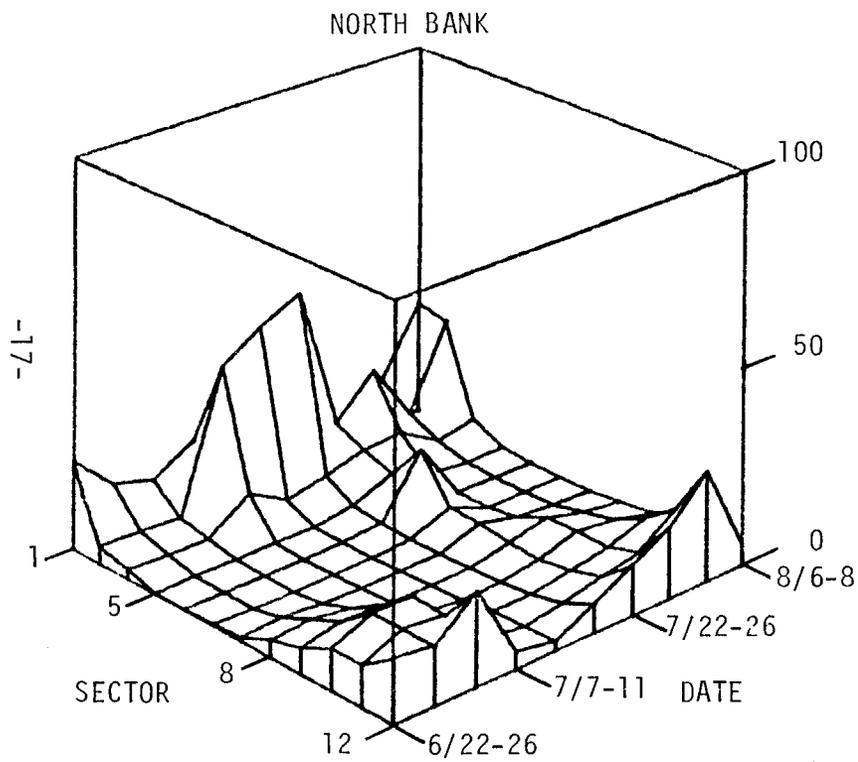
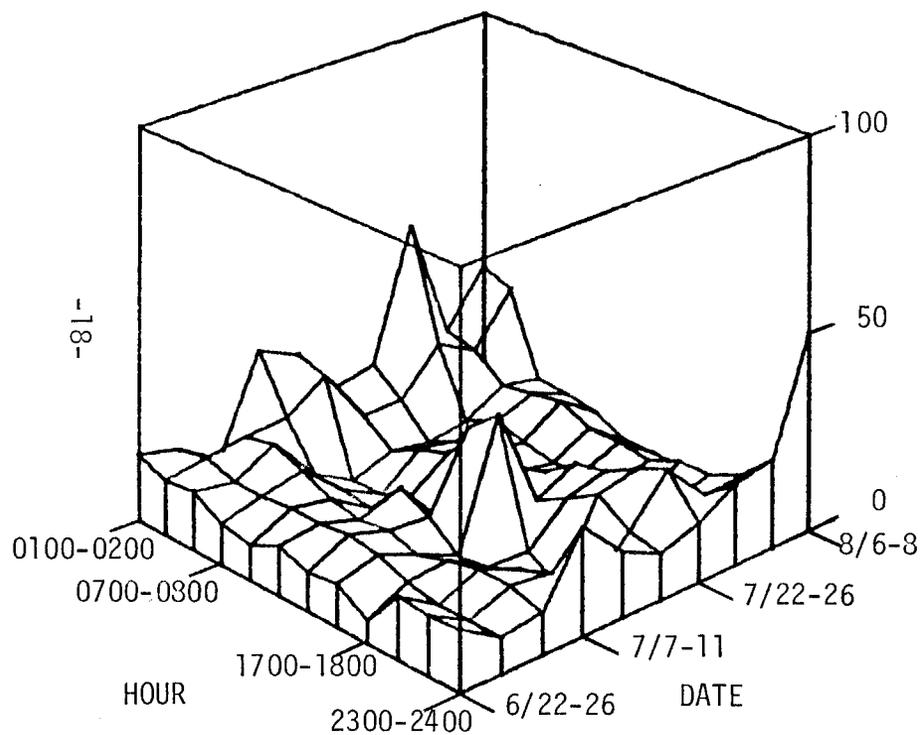


Figure 5. Kenai River side-scan sonar count sector distribution over time (grouped in five-day time periods), 22 June - 8 August 1984.

NORTH BANK



SOUTH BANK

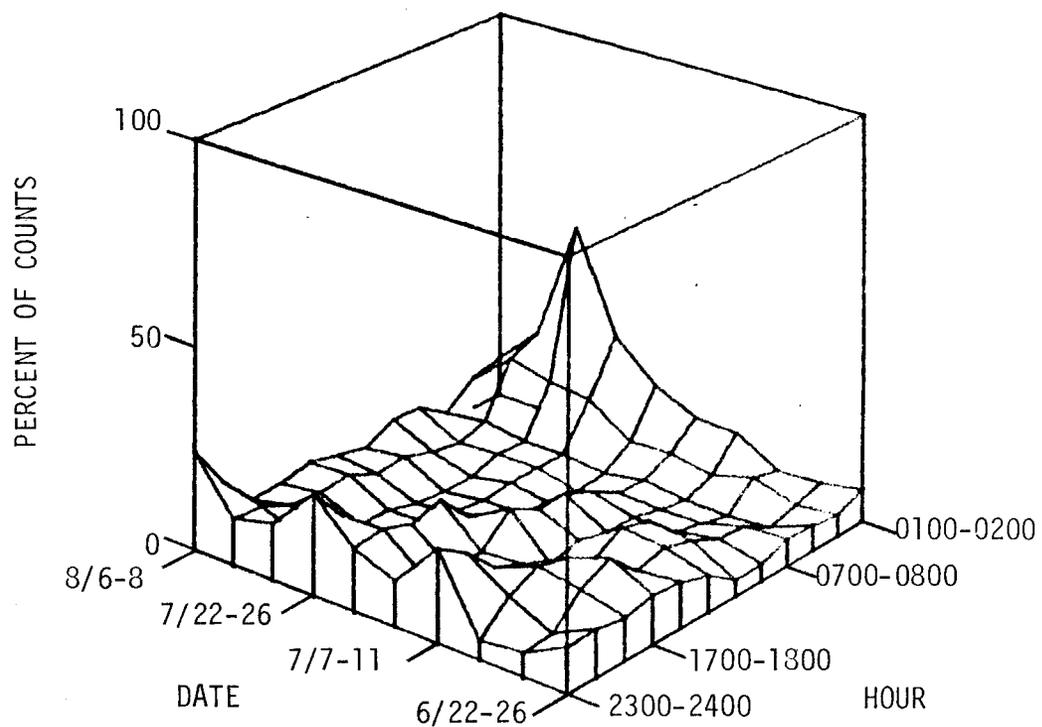


Figure 6. Kenai River side-scan sonar count hourly distribution over time (two-hour increments grouped in five-day time periods), 22 June - 8 August 1984.

days, respectively, for the north bank, south bank, and both banks combined (Table 5 and Appendix Tables 11 and 12). Eighty percent of the escapement passed the sonar counters in a period of 24 days, making this an escapement of long duration relative to recent years (Table 6). Length of escapement duration may in part be due to commercial harvest tactics used in 1984 when the majority of the catch by the Central District drift fleet was taken prior to 18 July. After this date, the fishery was curtailed to allow adequate escapement to reach the river (Ruesch 1985).

Tagging efforts resulted in the placement of 693 tags in sockeye salmon, and subsequent recovery of 109 tags (15.7%; Appendix Table 13). A summary of tag recoveries by river mile is presented in Table 7. Rate of travel (miles per day) appears to be depressed in proximity to the sonar site although small sample size precludes confirmation of this phenomenon. Rate of travel in the vicinity of the tagging site may be a result of stress associated with the tagging process. Barrett et al. (1985) also found differences in travel rates between stations at different distances from the tagging location. Suggested possible causes included temporary tagging stress and/or milling activity. Other observations that the tagging process tends to temporarily slow down the rate of migration are found in Killick (1955) and Verhoeven and Davidoff (1962).

As expected, travel time generally increased with increasing distance from the tagging location. Average travel time to recovery sites at Hidden Creek (11.2 days) and the Russian River weir (20.3 days) compare favorably with travel times established by Davis et al. (1972) of 10.6 days, and 18 days to the same locations.

A total of 7,778 sockeye salmon was captured in fishwheels (Appendix Tables 14 and 15). Length and weight data were obtained from 2,065 and 502 fish, respectively. Average length, average weight, and ratio of males to females is presented by age class and sex in Appendix Tables 16 and 17.

Visual comparison of age composition by period and between methods (Table 8) indicated very little change in the proportion of the dominant age class regardless of sampling strategy or timing. However, Method II (of the three by-period analyses) met sample size requirements proposed by Bernard (1983) of 522 ageable fish per period (five age groups; predominant age group 40% of sample). Chi-square test on Method II data revealed that there was some difference in age class frequency by sampling period when all periods and all age classes were tested together ($\alpha = 0.05$). When sequential periods were tested in pairs, results indicated that differences in age class frequency occurred between sample periods one and two and two and three, but not between periods three and four. These data, when interpreted relative to results of Method I, indicate that there was a slight change in age composition in the first half of the season, and virtually no change in age composition during the second half of the escapement. Therefore, Method II was used to characterize the age composition of the escapement. The Kenai River sockeye salmon escapement was made up primarily of age 1.3 (38.2%), 1.2 (23.4%), 2.3 (19.2%), and 2.2 (12.8%) fish (Table 9).

Fish targets attributed to pink salmon, coho salmon, and chinook salmon are considered minimum estimates. Run timing, counter limitations, and spawning site locations relative to the sonar site are factors discussed in Tarbox et

Table 6. Date of cumulative percent of late run sockeye salmon counts recorded in the Kenai River, 1968-1984 1/.

Year	Date by 10% Interval									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1968	7/08	7/15	7/17	7/18	7/20	7/21	7/23	7/24	7/28	8/08
1969	6/20	6/21	6/23	6/27	7/01	7/06	7/12	7/19	7/28	8/09
1970	6/28	7/13	7/15	7/22	7/25	7/27	7/29	8/01	8/03	8/09
1972	7/17	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/29	8/01
1973	7/12	7/15	7/19	7/21	7/22	7/23	7/24	7/26	7/28	8/09
1974	7/04	7/08	7/12	7/16	7/17	7/21	7/25	7/28	8/02	8/07
1975	7/15	7/19	7/21	7/23	7/24	7/26	7/28	7/30	8/01	8/06
1976	7/09	7/15	7/19	7/20	7/20	7/21	7/22	7/24	7/28	8/25
1977	7/11	7/13	7/14	7/15	7/16	7/18	7/20	7/23	7/28	8/04
1978	7/16	7/17	7/17	7/18	7/19	7/20	7/21	7/26	8/01	8/23
1979	7/15	7/17	7/18	7/19	7/19	7/20	7/21	7/22	7/25	8/16
1980	7/17	7/17	7/17	7/18	7/10	7/19	7/20	7/21	7/22	9/05
1981	7/07	7/10	7/13	7/14	7/16	7/18	7/19	7/21	7/25	<u>2/</u>
1982	7/18	7/19	7/19	7/20	7/21	7/23	7/25	7/27	7/29	<u>3/</u>
1983	7/15	7/16	7/18	7/18	7/19	7/20	7/21	7/23	8/01	8/12
1984	7/16	7/18	7/18	7/20	7/22	7/23	7/24	7/25	8/08	<u>4/</u>

1/ Date on which percentage level equaled or exceeded.

2/ Estimated 1% of the escapement occurred after 2 August (end of enumeration period).

3/ Estimated 4% of the escapement occurred after 4 August (end of enumeration period).

4/ Estimated 3% of the escapement occurred after 8 August (end of enumeration period).

Table 7. Summary of tagged sockeye salmon movement patterns in the Kenai River, 1984.

River Mile	Location	No. of Tag Recoveries	Tag Recovery Method	Days from Tagging to Recovery		Average Rate of Travel Miles/Day ^{1/}	
				Range	Mean		
<0	East Forelands	1	Set gill net	-	-	11.0	-3.2
<0	Kalifonsky Beach	1	Set gill net	-	-	11.0	-2.0
9		1	Gill net	Same day			-10.0
11		2	Hook and line	3	5	4.0	-2.0
14		1	Gill net	-	-	8.0	-0.6
17		4	Hook and line	1	7	3.8	-0.7
18		5	Hook and line	0	3	1.6	-0.9
19		1	Hook and line	Same day			--
19.5	Tagging site	4	Fishwheel-recapture	0	16	7.8	--
19.5	Tagging site	6	Recovered dead	2	8	3.0	--
21		5	Hook and line	1	3	1.6	+0.9
23		2	Hook and line	3	4	3.5	+1.0
29		1	Hook and line	-	-	6.0	+1.5
31		1	Hook and line	-	-	4.0	+2.8
36		3	Hook and line	6	9	7.3	+2.3
46		1	Hook and line	-	-	3.0	+8.9
66	Hidden Creek ^{2/}	26	Weir	5	25	11.2	+4.2
74	Russian R. confluence	4	Hook and line	7	13	9.5	+5.7
76.5	Russian River ^{3/}	19	Weir	8	39	20.3	+2.8
84	Quartz Creek	12	Weir	11	35	21.9	+2.9
105	Railroad Creek	1	Hook and line	-	-	22.0	+3.9

1/ Sign indicates direction of travel after tagging.

2/ Includes approximately 3 miles of travel up Hidden Creek above the mouth at Skilak Lake.

3/ Includes approximately 2.5 miles of travel up Russian River above confluence with the Kenai River.

Table 8. Comparison of four methods of determining age composition of sockeye salmon collected in the Kenai River, 1984.

Method	Percent Composition by Age Class ^{1/}										Sample Size
	1.1	0.3	1.2	2.1	1.3	2.2	1.4	2.3	3.2	3.3	
I ^{2/}	0.1	1.1	23.1 (3.8)	0.5	37.8 (3.4)	13.2 (4.0)	3.6	19.5 (3.9)	1.0	0.1	2,364
II ^{3/}	0.2	1.0	23.4 (3.8)	0.6	38.2 (3.4)	12.8 (4.0)	3.5	19.2 (4.0)	1.0	0.2	2,364
III ^{4/}	0.1	0.9	20.4 (6.3)	0.6	39.4 (4.6)	11.9 (5.6)	4.1	21.9 (5.4)	0.5	0.2	1,140
IV ^{5/}	0.2	0.8	28.7 (6.8)	0.6	35.6 (6.5)	12.3 (7.7)	3.3	17.3 (8.2)	1.4	0	668

1/ 95% confidence interval: ± figures in parenthesis.

2/ Method I - All age composition samples grouped together; age composition not weighted to numbers in escapement.

3/ Method II - Combined, weighted age compositions from four periods using data from all dates within each period.

4/ Method III - Combined, weighted age composition from four periods using data from one or more, but not all, dates within each period.

5/ Method IV - Combined, weighted age composition from four periods using up to 40 samples per day within each period.

Table 9. Age composition of sockeye salmon collected in the Kenai River, 1969-1984.

Sample Period	Percent Composition by Age Class								Sample Size
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	Other	
6/22-7/18/84	0	24.7	42.6	1.3	0.2	11.9	18.2	1.0	580
7/19-7/22/84	0	20.4	35.0	3.8	0.1	15.0	22.5	3.1	808
7/23-7/25/84	0	25.3	37.7	4.3	0	10.0	20.0	2.6	467
7/26-end	0.7	23.2	36.0	5.5	2.1	14.6	15.8	4.2	509
Seasonal Summary									
1969	tr	9.0	36.0	2.0	3.0	36.0	13.0	tr	382
1970	tr	10.0	17.0	tr	26.0	25.0	15.0	6.0	225
1971		8.0	39.0	1.0	3.0	38.0	11.0		168
1972		21.0	34.0			23.0	20.0		403
1973		5.0	68.0	1.0	1.0	8.0	16.0		632
1974	2.0	18.0	46.0		3.0	18.0	12.0		295
1975	2.0	10.0	36.0	2.0	4.0	31.0	14.0	1.0	163
1976	1.0	46.0	20.0		2.0	22.0	8.0	1.0	948
1977		6.0	76.0	1.0	tr	7.0	10.0		1,265
1978 ^{1/}		2.5	86.7			4.9	5.4	tr	811
1979 ^{2/}	tr	20.2	61.1			11.8	6.2	tr	601
1980 ^{2/}		27.7	45.1			16.2	10.1	tr	715
1981 ^{2/}		16.2	70.9			8.1	4.8		1,757
1982 ^{2/}	0.1	5.8	87.5	tr		2.9	3.7		1,787
1983	0.4	8.2	79.1	0.2	0.5	2.2	8.9	0.4	1,765
1984 ^{2/}	0.2	23.4	38.2	3.5	0.6	12.8	19.2	2.2	2,364

1/ 1978 weighted - Source: Bethe et al. (1980).

2/ Percentages weighted by total numbers of fish in escapement.

al. (1981 and 1983) which influence accuracy of escapement estimates for these species. No additional pink salmon and coho salmon escapement estimates were made for the mainstem Kenai River, but available information concerning tributary spawning populations is summarized in Table 4. ADF&G Sport Fish Division estimated 39,172 late run chinook salmon (range 25,003-64,687) entered the Kenai River in 1984, with a harvest of 7,376 fish (Hammarstrom et al. 1985).

Sonar counts attributed to sockeye salmon appear to be a relatively accurate measurement of escapement within the Kenai River drainage. The magnitude of the run and short duration of entry are ideal for counting with the Bendix system. Despite the less than ideal shore oriented behavior exhibited by fish migrating up the north bank, oscilloscope monitoring during critical passage periods indicated that 95% of the total fish targets counted were within the 18 m normal operating range of side-scan sonar. In addition, entry of sockeye salmon into the drainage is earlier than coho salmon and pink salmon escapements, and the difference in run size between sockeye salmon and chinook salmon implies that this is essentially a single species system relative to escapement estimation errors caused by misapportionment of fish targets.

Kasilof River

A total of 234,723 fish targets were counted at the Kasilof River sonar site from 10 June through 31 July 1984 (Appendix Table 18). The apportioned sockeye salmon count of 216,988 was expanded to account for fish migration into the system prior to 10 June and after 31 July, resulting in a total sockeye salmon escapement estimate of 231,685 (Table 1). This total exceeds the maximum escapement goal of 150,000 fish by approximately 54% and represents the fifth consecutive year that the goal has been exceeded.

The Fisheries Rehabilitation, Enhancement, and Development Division (FRED) Crooked Creek Hatchery contribution to the escapement was estimated to be approximately 15% (preliminary data; Flagg 1984). Adults returning in 1984 used for artificial propagation numbered 11,141, reducing the number of potential natural spawners to 220,544 (Table 10).

Approximately 74% of the estimated sockeye salmon escapement was enumerated in tributaries of Tustumena Lake (Table 11). Nearly one-half (Table 12; 47.1%) of the enumerated spawners entered Glacier Flat Creek, exceeding historic spawner numbers and optimum spawner densities presented in Tarbox et al. (1983).

Spawning ground tag recovery data are presented in Appendix Table 19 and summarized in Figure 7. This histogram illustrates the percentage of total tags recovered in Tustumena Lake tributaries (grouped by date of tagging at the sonar site) expressed in number of fish enumerated by sonar during each tagging period. In contrast to previous years, Bear Creek and Glacier Flat Creek fish were present at the sonar site in relatively high numbers throughout the counting period.

Tag recovery data were also examined to determine mean lake residence time (in days) of fish bound for Bear and Glacier Flat Creeks (Table 13). It appears that, as might be expected, travel time (residence time) was greater

Table 10. Kasilof River sockeye salmon escapement summary, 1968-1984.

Year	Sonar Count ^{1/}	Fish Used for Artificial Propagation of Tustumena Lake	Sonar Count Less Egg Take ^{2/}
1968	89,000		
1969	46,000		
1970	38,000		
1971	--		
1972	113,000		
1973	40,000		
1974	70,000	205 ^{3/}	69,795
1975	48,000	3,365 ^{3/}	44,635
1976	139,000	5,463 ^{3/}	133,537
1977	155,300	1,794 ^{3/}	153,506
1978	116,600	6,681 ^{3/}	109,919
1979	152,179	3,024 ^{3/}	149,155
1980	187,154	6,030 ^{3/}	181,124
1981	256,625	9,700 ^{4/}	246,925
1982	180,239	11,571 ^{4/}	168,668
1983	210,271	9,903 ^{4/}	200,368
1984	231,685	11,141 ^{4/}	220,544

^{1/} Multiple transducer sonar counts rounded to the nearest thousand (1968-1977) from Namtvedt et al. (1979). Side scan sonar counts (1978-1981) from Tarbox et al. (1983).

^{2/} Considered estimate of natural spawners above sonar site.

^{3/} From Cross et al. (1983).

^{4/} Waite, personal communication.

Table 11. Peak sockeye salmon escapement counts in seven index areas, Kasilof River drainage, 1975-1984 ^{1/}.

Year	Nikolai	Crystal	Clear	Glacier Flat	Seepage	Moose	Bear	Total Index Count ^{2/}
1975	5,700	400	300	14,400	3,700	3,300	27,700	55,500
1976	12,000	800	300	7,100	800	14,000	51,800	86,800
1977	29,100	600	1,800	5,800	800	16,600	58,000	112,700
1978	34,200	200	200	4,700	1,100	15,900	43,400	99,700
1979	19,100	500	400	5,600	800	8,100	35,900	70,400
1980	10,000	1,000	2,100	15,500 ^{3/}	1,800	15,600	125,000 ^{3/}	171,400
1981	36,000	860	2,978	40,071 ^{3/}	3,376	12,968	75,117 ^{3/}	171,400
1982	16,800	1,785	4,183	17,348 ^{3/}	1,638	13,400	51,350 ^{3/}	106,500
1983	17,100	1,657	860	38,776 ^{3/}	3,305	19,245	61,957 ^{3/}	142,900
1984	8,270	141	2,619	76,217 ^{3/}	6,250	13,999	54,328 ^{3/}	161,800

^{1/} Counts standardized to common unit for years entire stream was not surveyed. Relative abundance per section (when entire system surveyed) was used to extrapolate for years when only a portion of stream was surveyed. Numbers rounded to nearest hundred fish.

^{2/} Rounded to nearest 100 fish.

^{3/} F.R.E.D. Division weir count.

Table 12. Distribution (percent)^{1/} of sockeye salmon in the major index tributary systems of Tustumena Lake, 1975-1984.

Year	Nikolai	Moose	Bear	Glacier Flat	Other
1975	10.2	5.9	49.9	25.9	8.1
1976	13.8	16.2	59.8	8.2	2.0
1977	25.8	14.7	51.5	5.1	2.9
1978	34.3	15.9	43.5	4.7	1.6
1979	27.1	11.5	51.0	7.9	2.5
1980	5.8	9.1	73.1 ^{2/}	9.0 ^{2/}	3.0
1981	21.0	7.6	43.8 ^{2/}	23.3 ^{2/}	4.3
1982	15.8	12.6	48.2 ^{2/}	16.3 ^{2/}	7.1
1983	12.0	13.5	43.4 ^{2/}	27.1 ^{2/}	4.0
1984	5.1	8.7	33.6 ^{2/}	47.1 ^{2/}	5.6

^{1/} Percent of total index count.

^{2/} F.R.E.D. Division weir count.

Table 13. Mean residence time in Tustumena Lake of sockeye salmon bound for Glacier Flats and Bear Creek, 1984 1/.

Tributary	Tagging Period	# Tags Recovered	Mean Residence Time (days)	Range
Glacier Flat Creek ^{2/}	6/10-7/06	33	42.6	33-60
	7/07-7/15	76	32.5	24-48
	7/16-7/18	6	26.2	25-39
	7/19-7/26	60	23.9	15-37
Bear Creek ^{3/}	6/10-7/06	55	33.4	23-51
	7/07-7/15	77	26.8	13-48
	7/16-7/18	8	22.9	12-33
	7/19-7/26	33	24.2	13-32

1/ Fish tagged at the Kasilof River Bridge sonar site.

2/ Weir operational 7 August to 29 August 1984.

3/ Weir operational 27 July to 22 August 1984.

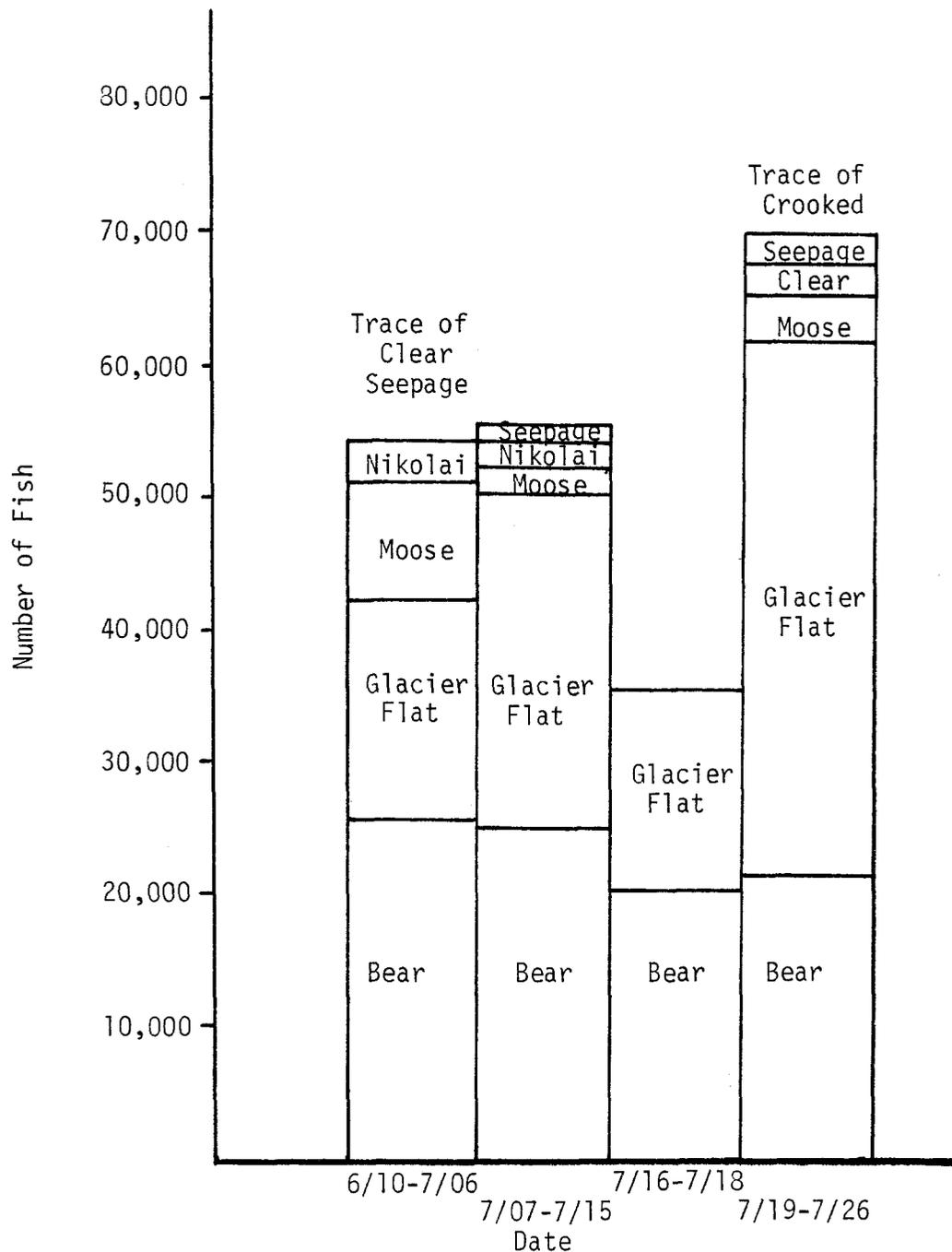


Figure 7. Percent of total tags recovered by spawning area (grouped by date of tagging at the Kasilof River sonar site) expressed in the number of fish enumerated by sonar during each tagging period. Note: a small proportion of tags were recovered in spawning areas outside of Tustumena Lake.

for fish bound for Glacier Flat Creek. There was also a tendency for residence time to be shorter as the season progressed. For example, Bear Creek sockeye salmon tagged 10 June-6 July averaged 42.6 days between the sonar site and weir while those fish tagged between 19-26 July had a mean lake residence time of 23.9 days.

Nine percent of the sockeye salmon tag recoveries were from sites downstream of the tagging location. The majority of these fish (30 of 41 total) were taken in set gill net adjacent to the mouth of the Kasilof River, with the remaining tags recovered in the Central District by the drift fleet, at the Crooked Creek weir, or in the Kasilof River dip net fishery (Appendix Table 19). The drop in number of downstream recaptures in 1984 relative to 1983 is attributed primarily to changes in fish handling procedures.

The midpoint of the sockeye salmon escapement occurred on 15 July. There was, however, a difference in midpoint of the run of seven days between banks (Table 5 and Appendix Tables 20 and 21). Eighty percent of the escapement occurred in 26 days (Table 14), well within the historic range of 11 to 35 days.

Additional migratory behavior analysis revealed bank selection, sector distribution, and hourly distribution patterns similar to those exhibited in 1983 (Table 5 and Figures 8 and 9). Approximately 91% of the north bank and 83% of the south bank fish targets were recorded within 5 m of the transducer (Appendix Tables 22 through 25). Counts by hour were nearly equally distributed throughout the day (Appendix Tables 26 through 29). There was, however, a slight tendency towards offshore distribution, and an increased passage rate between midnight and 0400 hr early in the season (prior to 25 June).

A total of 4,917 salmon were captured in fishwheels at the Kasilof River sonar site from 17 June through 27 July (Appendix Tables 30 and 31), including 4,749 sockeye salmon. Age 1.2 (50.5%), 1.3 (24.8%), and 2.2 (17.9%) fish were the dominant sockeye salmon age classes (Table 15), with a shift in relative percentage by age class as the season progressed. A Chi-square test conducted on the data indicated a statistically significant difference ($\alpha = 0.05$) in age class frequencies between each sampling period. A comparison of methods used to derive seasonal age composition (Table 16) indicated that the contribution of age 1.2 fish was underestimated when all samples were combined (unweighted; Method I). Examination of the data suggests seasonal age composition generated by Methods II, III and IV are the same. Results from Method II were selected to represent the escapement because confidence intervals associated with the proportions of the major age classes derived by this method were smaller than those derived with Method III and IV, and minimum sample size requirements were not met for one of four periods in the Method III analysis. Average length and weight data by age class, and sex ratios (males to females) are presented in Appendix Tables 32 and 33.

Run timing, counter limitations, and spawning locations relative to the sonar site are factors which prevent escapement estimates for Kasilof River pink salmon, coho salmon, and chinook salmon. Weir counts of chinook salmon and coho salmon were, however, conducted by the FRED Division for Crooked Creek (a lower river tributary of the Kasilof River). A total of 4,022 chinook

Table 14. Date of cumulative percent of sockeye salmon counts recorded in the Kasilof River, 1968-1984.

Year	Date by 10% Interval ^{1/}									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1968	7/04	7/06	7/08	7/11	7/12	7/14	7/17	7/20	7/23	7/31
1969	6/25	6/25	6/30	7/02	7/02	7/06	7/11	7/18	7/25	8/09
1970	6/27	7/03	7/07	7/09	7/12	7/14	7/17	7/23	7/27	8/06
1972	7/15	7/21	7/22	7/22	7/23	7/23	7/24	7/24	7/25	8/03
1973	7/04	7/09	7/11	7/13	7/15	7/18	7/20	7/23	7/26	8/05
1974	7/04	7/05	7/06	7/08	7/11	7/13	7/17	7/23	7/23	8/07
1975	7/05	7/07	7/09	7/13	7/16	7/19	7/21	7/24	7/28	8/07
1976	7/06	7/07	7/10	7/13	7/16	7/19	7/20	7/22	7/28	8/09
1977	7/04	7/08	7/11	7/12	7/14	7/15	7/17	7/20	7/25	8/04
1978	6/30	7/03	7/06	7/09	7/16	7/17	7/17	7/18	7/20	8/06
1979	6/28	7/02	7/05	7/07	7/12	7/15	7/19	7/23	7/27	8/14
1980	6/30	7/02	7/05	7/11	7/16	7/18	7/21	7/25	8/03	8/14
1981	6/18	6/24	6/28	7/01	7/04	7/07	7/10	7/14	7/20	<u>2/</u>
1982	7/03	7/13	7/16	7/17	7/19	7/20	7/21	7/27	<u>3/</u>	
1983 ^{4/}	7/01	7/07	7/12	7/14	7/16	7/17	7/18	7/22	<u>5/</u>	
1984 ^{4/}	6/29	7/05	7/08	7/10	7/15	7/17	7/19	7/21	7/24	<u>6/</u>

^{1/} Date on which percentage level equaled or exceeded.

^{2/} Estimated 2% of the escapement occurred after 31 July (end of enumeration period).

^{3/} Estimated 11% of the escapement occurred after 3 August (end of enumeration period).

^{4/} Data taken at the Bridge site. Previous years' data taken from the slack-water site below the outlet of Tustumena Lake.

^{5/} Estimated 12% of the escapement occurred after 31 July (end of enumeration period).

^{6/} Estimated 6% of the escapement occurred after 31 July (end of enumeration period).

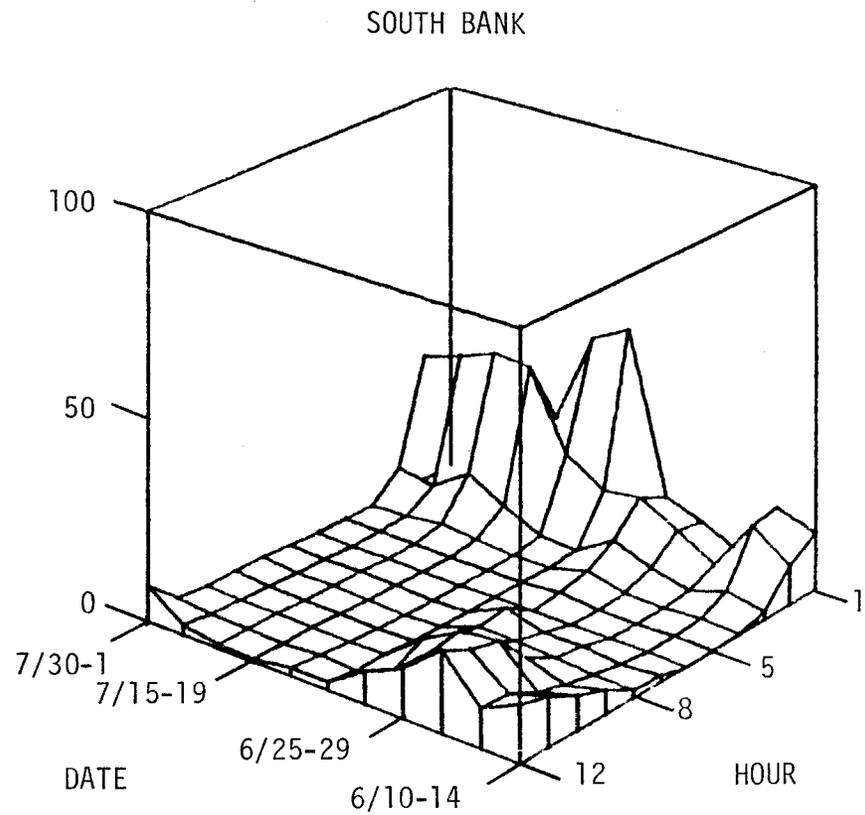
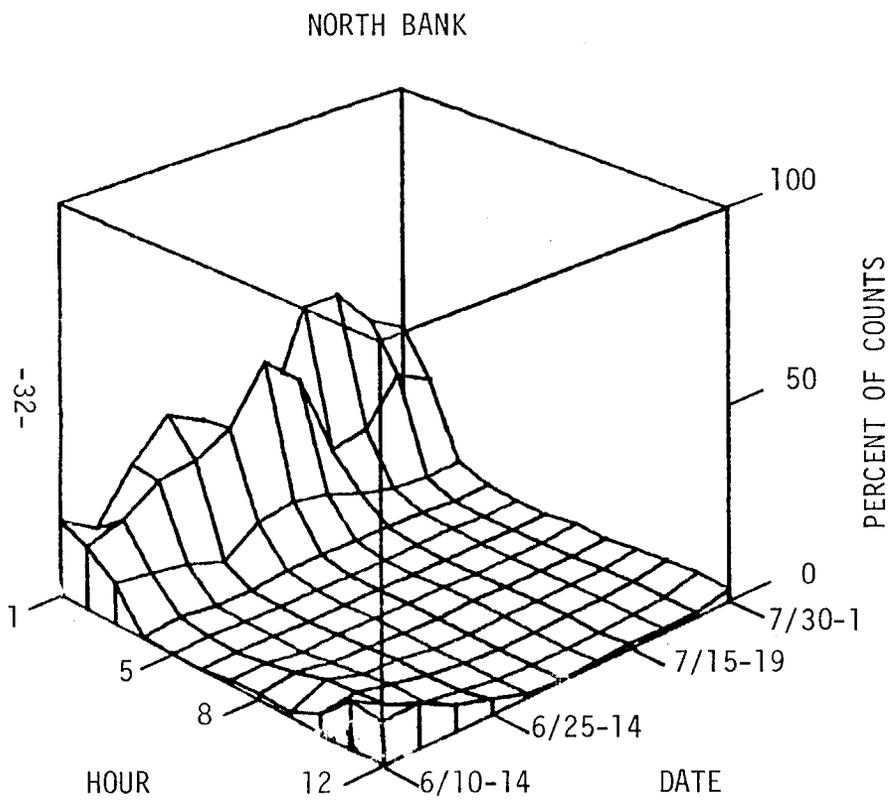
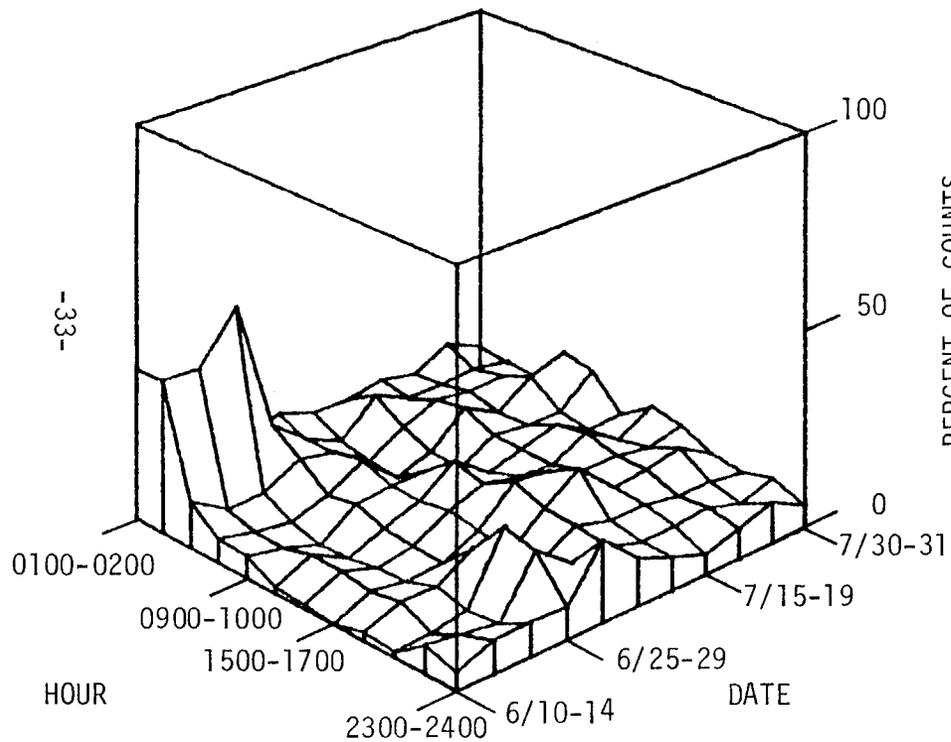


Figure 8. Kasilof River side-scan sonar count sector distribution over time (grouped in five-day time periods), 10 June-31 July 1984.

NORTH BANK



SOUTH BANK

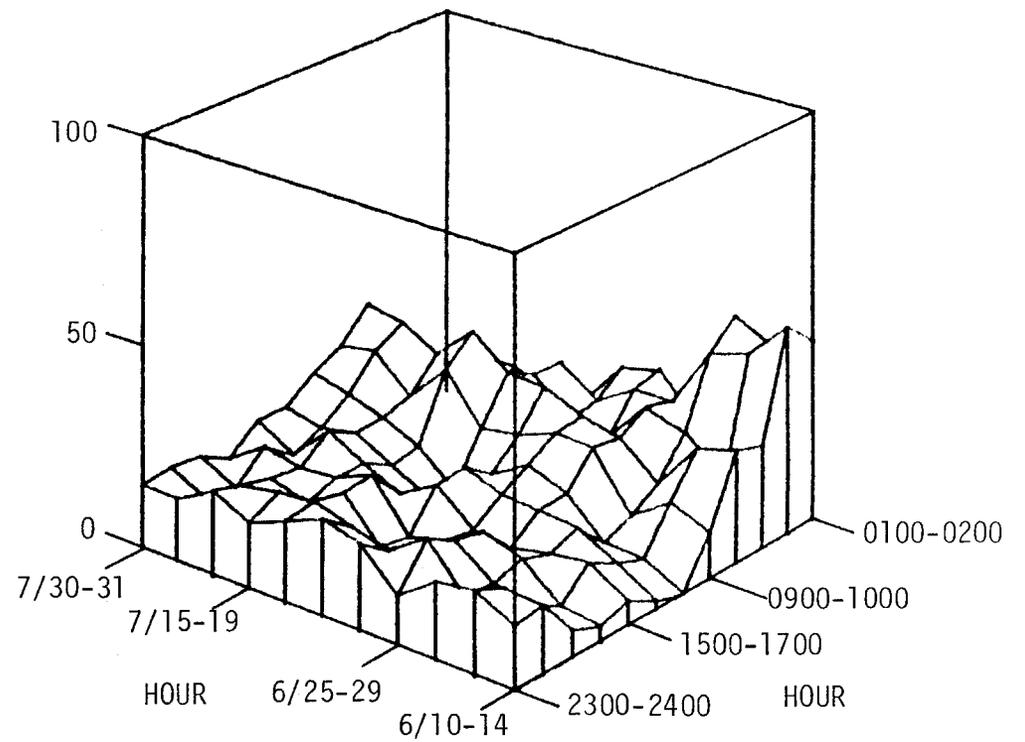


Figure 9. Kasilof River side-scan sonar count hourly distribution over time (two-hour increments grouped in five-day time periods), 10 June-31 July 1984.

Table 15. Age composition of sockeye salmon collected in the Kasilof River, 1969-1984 ^{1/}.

Sample Period	1.1	1.2	1.3	1.4	2.1	2.2	2.3	Other	Sample Size
6/18 - 7/04/84		27.3	48.4			12.7	11.6		945
7/05 - 7/15/84		42.3	28.1	0.2		21.4	8.0		477
7/16 - 7/18/84		53.3	12.7			29.2	4.8		520
7/19 - 7/25/84		71.9	9.2		0.6	15.6	2.8		327
Seasonal Summary									
1969		14.0	39.0	1.0		30.0	16.0		399
1970	tr	32.0	37.0	2.0		16.0	11.0	1.0	297
1971		6.0	69.0			8.0	16.0		153
1972	tr	42.0	36.0	1.0	tr	3.0	18.0	tr	668
1973		20.0	57.0			19.0	4.0		374
1974		35.0	59.0		tr	4.0	2.0		254
1975	1.0	29.0	7.0			53.0	4.0	1.0	931
1976	tr	32.0	20.0		tr	35.0	12.0		755
1977	tr	30.0	30.0		1.0	28.0	11.0		1,209
1978		42.0	35.0			14.0	9.0		967
1979 ^{1/}		52.2	37.2		tr	8.4	1.7	tr	590
1980 ^{1/}		58.7	27.8			8.0	4.5	1.0	899
1981 ^{1/}		30.2	62.2			6.0	1.6		1,479
1982 ^{1/}	1.0	34.0	49.5		0.1	10.7	4.7	0.1	1,518
1983 ^{1/}		48.4	34.3			12.8	4.5		1,997
1984 ^{1/}		50.5	24.8	tr	0.2	17.9	6.6		2,269

^{1/} Percentages weighted by total numbers in escapement.

Table 16. Comparison of four methods of determining age composition of sockeye salmon collected in the Kasilof River, 1984.

Method	Percent Composition by Age Class ^{1/}						Sample Size
	1.2	2.1	1.3	2.2	1.4	2.3	
I ^{2/}	43.0 (3.1)		30.3 (3.4)	18.7 (3.7)		8.0	2,269
II ^{3/}	50.5 (3.1)	0.2	24.8 (4.5)	17.9 (4.5)	0.4	6.6	2,269
III ^{4/}	51.2 (3.9)		21.5 (5.5)	19.9 (5.4)		7.5	1,333
IV ^{5/}	50.0 (4.3)	0.4	25.3 (6.2)	17.9 (6.0)		6.6	1,074

^{1/} 95% Confidence Interval: ± figures in parenthesis.

^{2/} Method I - All age composition samples lumped together; age composition not weighted to numbers in escapement.

^{3/} Method II - Combined, weighted age composition from four periods using data from all dates within each period.

^{4/} Method III - Combined, weighted age composition from four periods using data from one or more, but not all, dates within each period.

^{5/} Method IV - Combined, weighted age composition from four periods using up to 40 samples per day within each period.

salmon of Crooked Creek origin was enumerated in 1984 (Flagg 1984). Over 72% of the chinook salmon reaching the weir were estimated to be of hatchery origin. The coho salmon count at the Crooked Creek weir was 1,166 (Dave Waite, pers. comm.).

A total of 39 chinook salmon were tagged at the Kasilof River enumeration site in 1984. Six tags were recovered including three at the Crooked Creek weir, two from the set gillnet fishery (Clam Gulch and Kalifonsky Beaches), and one taken by hook and line in the Kenai River.

It appears from the data gathered that sockeye salmon sonar counts are a relatively accurate measure of escapement within the Kasilof River drainage. Shore oriented migratory behavior which resulted from relatively high water velocities during the major portion of the run probably resulted in most fish moving through the hydroacoustic beam. Additionally, the predominance of sockeye salmon in fishwheel catches indicated this was primarily a single species system during the period of enumeration, and finally documented sockeye salmon spawning areas are above the new sonar site.

Crescent River

A total of 111,109 fish targets were counted entering Crescent River from 15 June through 31 July 1984. The apportioned sockeye salmon count of 105,691 (Appendix Table 34) was expanded to 118,345 to account for fish passing the sonar site after 31 July (Table 1). This escapement estimate substantially exceeded the goal of 50,000 established in 1979 (Tarbox et al. 1983).

As expected from current velocity profiles performed during the site selection process (unpublished data), fish movement was concentrated very close to shore at the lower river enumeration site. Approximately 88% of the north bank and 95% of the south bank fish targets were enumerated within 2 m of the transducer (Figure 10 and Appendix Tables 35 through 38). Fish movement was also concentrated between 1300 hr and 2200 hr throughout the enumeration period (Figure 11 and Appendix Tables 39 through 42). Both parameters (shore orientation and hourly distribution) were similar to the range of historical data collected at the Crescent Lake outlet site.

Approximately 80% of the fish targets were enumerated in 30 days (Table 17). Two peaks in escapement were observed beginning 10 July and separated by seven days (Appendix Table 34). Corresponding multiple peaks occurred on each bank (Appendix Tables 43 and 44). Seventy-one percent of the fish targets were recorded by the north bank counter (Table 5).

Run duration at the new site was similar to that seen in previous years at the Crescent Lake outlet site. Run timing (as measured by the 10% cumulative count date) was seven days earlier in 1984 than the mean 10% date from previous years. The difference in timing was attributed directly to moving the site to the lower river. The apparent bimodal entry pattern may have been contributed to by the commercial fishery (Figure 12; continuous commercial fishing in the Western Subdistrict began 13 July), and/or relatively low and clear flows from 8 to 15 July. Apparent preference for the north bank for travel may be a result of direction of entry into the

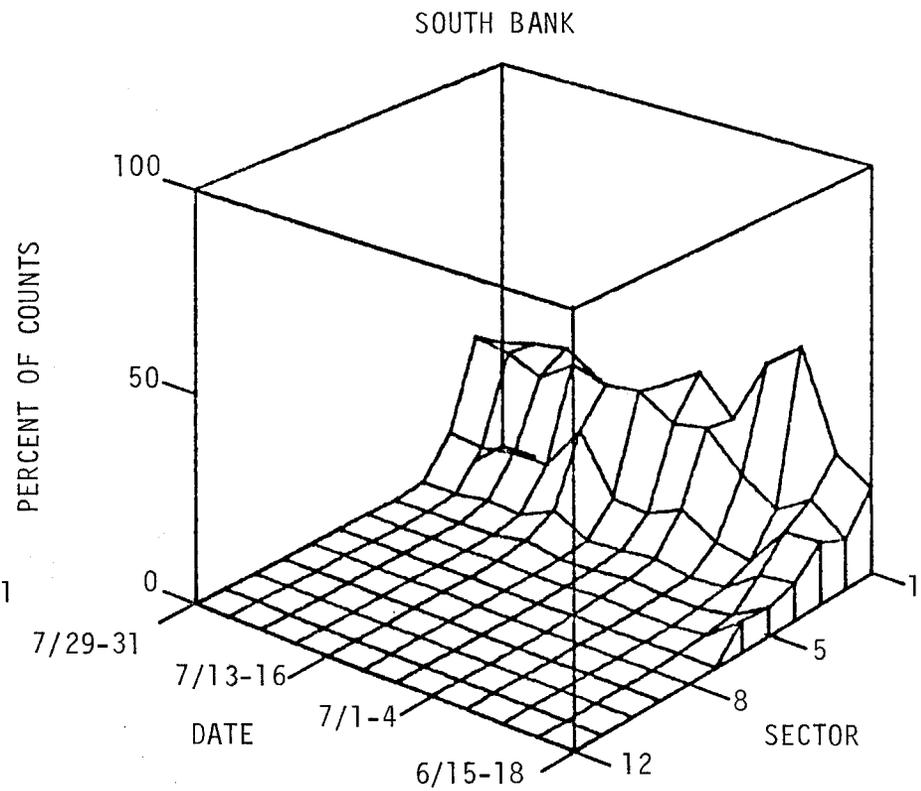
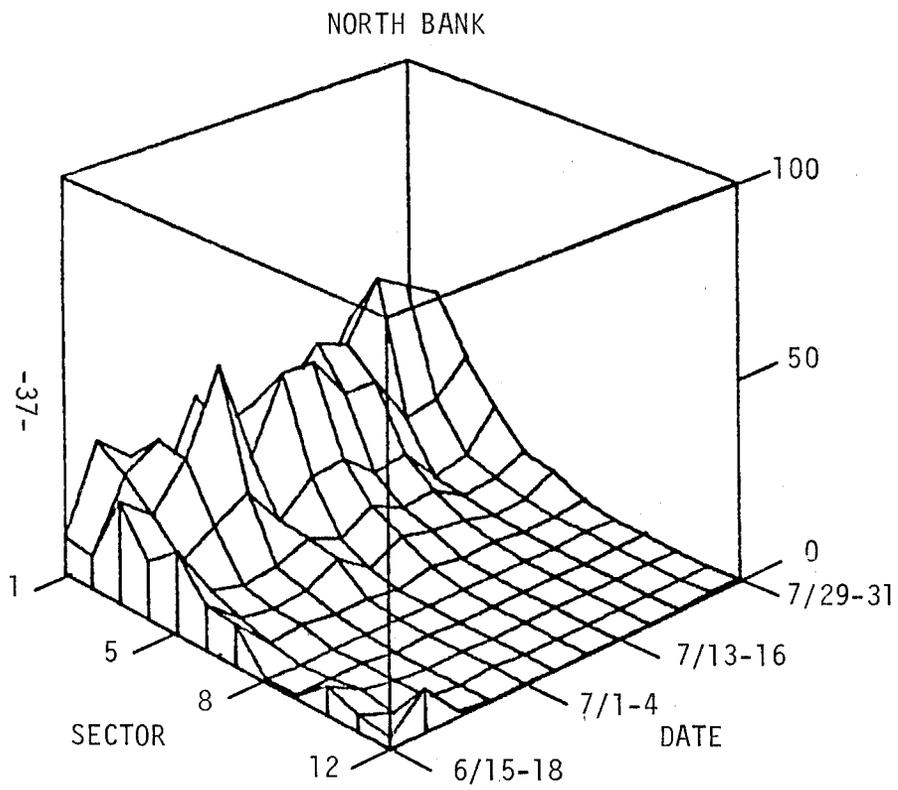
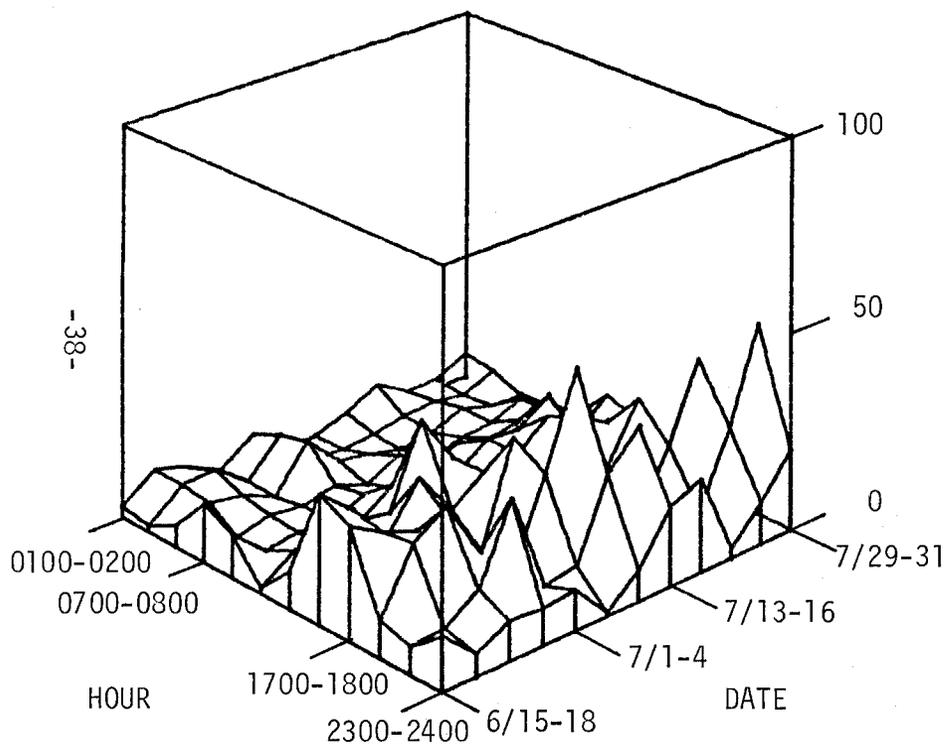


Figure 10. Crescent River side-scan sonar count sector distribution over time (grouped in four-day time periods), 15 June - 31 July 1984.

NORTH BANK



SOUTH BANK

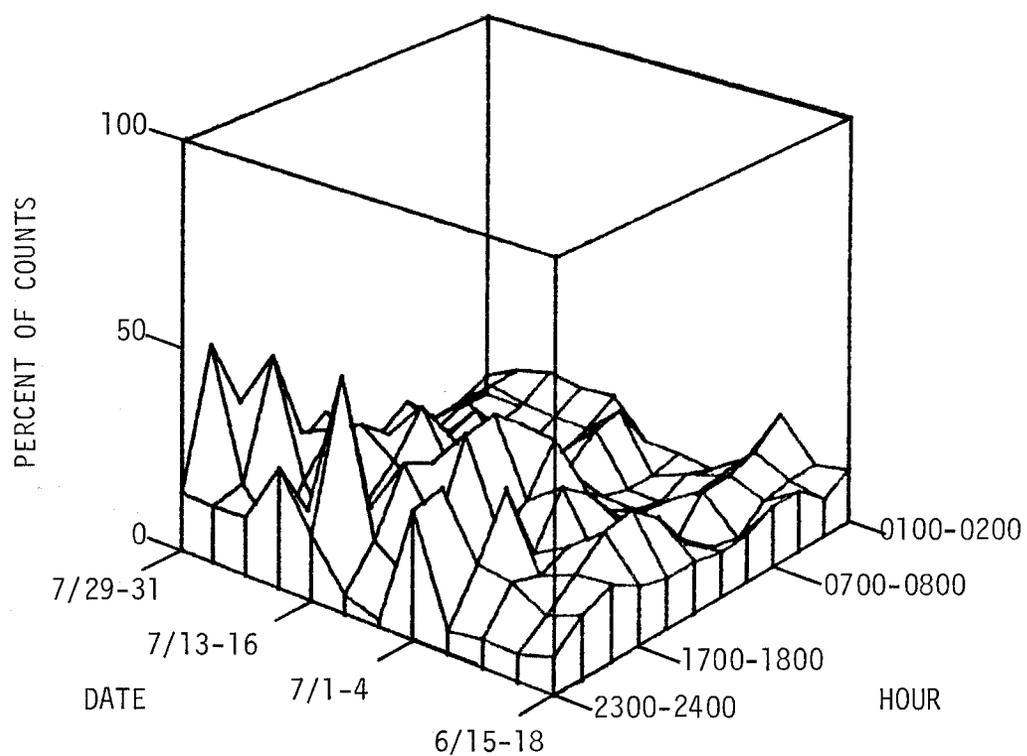


Figure 11. Crescent River side-scan sonar count hourly distribution over time (two-hour increments grouped in four-day time periods), 15 June-31 July 1984.

Table 17. Date of cumulative percent of sockeye salmon counts recorded in the Crescent River, 1979-1984 1/.

Year	Date by 10% Interval									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1979	7/09	7/11	7/12	7/14	7/17	7/20	7/22	7/24	7/31	8/13
1980	7/12	7/18	7/20	7/21	7/22	7/24	7/26	7/29	8/03	8/15
1981	7/06	7/12	7/16	7/19	7/21	7/22	7/24	7/29	8/04	<u>2/</u>
1982	7/11	7/14	7/18	7/20	7/21	7/23	7/25	7/28	<u>3/</u>	
1983	7/09	7/12	7/14	7/16	7/19	7/20	7/22	7/26	7/30	<u>4/</u>
1984 ^{5/}	7/02	7/07	7/09	7/11	7/15	7/17	7/19	7/21	<u>6/</u>	

- 1/ Date on which percentage level equaled or exceeded.
- 2/ Estimated 3% of the escapement occurred after 9 August (end of enumeration period).
- 3/ Estimated 11% of the escapement occurred after 31 July (end of enumeration period).
- 4/ Estimated 6% of the escapement occurred after 31 July (end of enumeration period).
- 5/ Data collected at the lower river site (approximately one and one-half miles from Cook Inlet). Previous years' data collected at the outlet of Crescent Lake.
- 6/ Estimated 12% of the escapement occurred after 31 July (end of enumeration period).

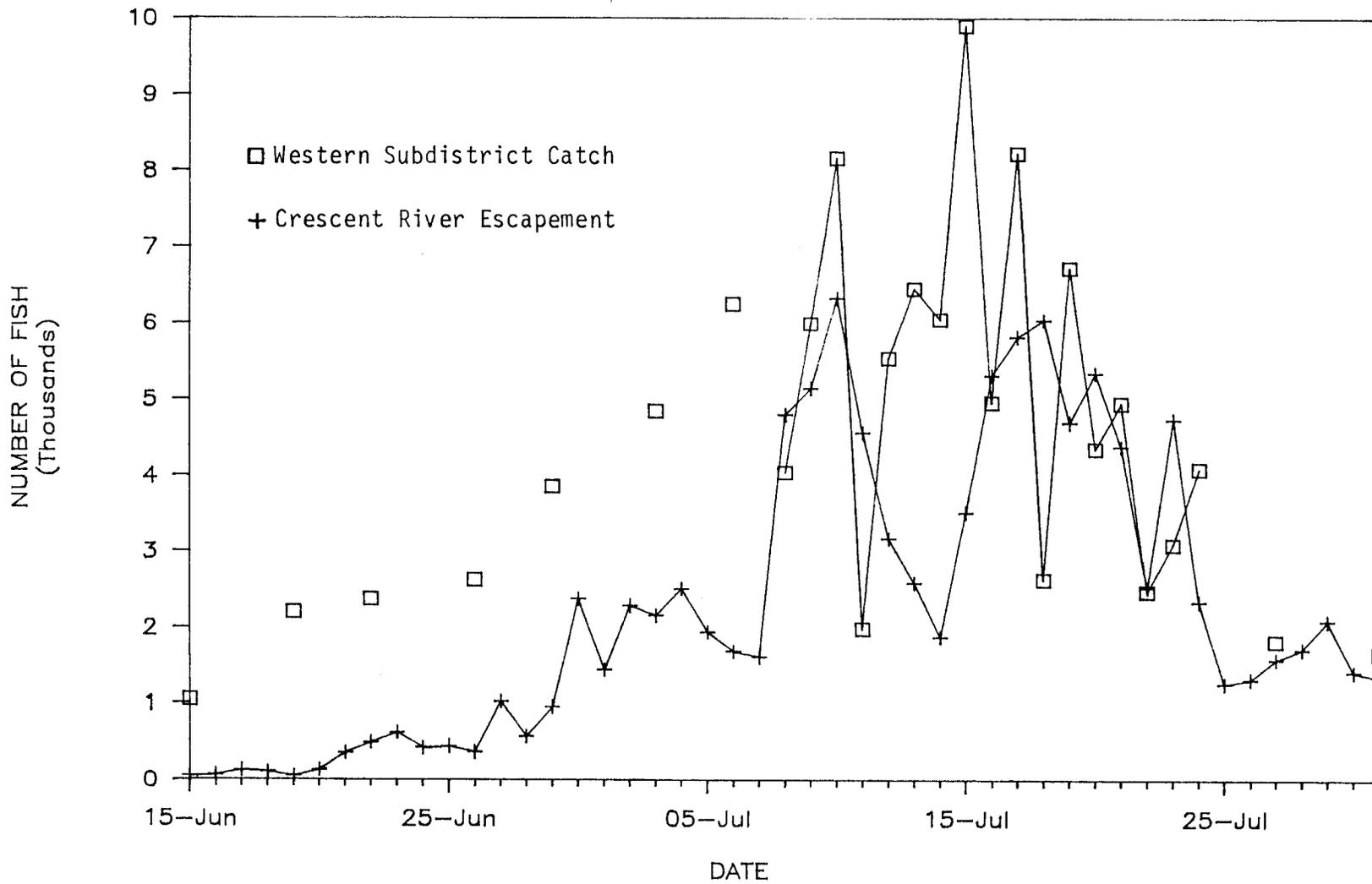


Figure 12. Daily sockeye salmon escapement into the Crescent River and commercial catch of sockeye salmon in the Western Subdistrict of Upper Cook Inlet, 1984.

river from Cook Inlet as water velocities are similar throughout the lower river to those measured at the site and may inhibit significant crossover after entry from saltwater.

Collection of fish for AWL samples was accomplished post season via beach seine in the near shore areas of Crescent Lake. Age structure of fish sampled was 59.4% age 2.3 fish, 20.0% age 2.2 fish, and 16.9% age 1.3 fish (Table 18). Average length and weight by sex and age class, and the ratio of males to females for sockeye salmon collected are presented in Appendix Tables 45 and 46.

It appears that siting criteria have been adequately met at the new lower Crescent River enumeration site (King 1984). River conditions (notably velocity) dictate inshore migration (and subsequent hydroacoustic measurement), and passage of fish primarily during daylight allowed periodic visual monitoring of the escapement. The lack of complete apportionment data (Appendix Table 47) does, however, affect the accuracy of sockeye salmon estimates. Initiation of sampling efforts at an earlier date likely would have reduced the total sockeye salmon count and increased that of other species.

Susitna River

Salmon escapement estimates by species reported for 1984 are a compilation of data gathered for the Susitna Hydroelectric Project (Barrett et al. 1985) in addition to information from Commercial Fisheries Division sonar enumeration efforts at Susitna Station.

Because of recurring sonar gear siting and counting problems on the west bank of the Susitna River in recent years (King and Tarbox 1984), it was decided to operate sonar gear only on the east bank of the Susitna River at Susitna Station in 1984. Daily counts from Yentna Station were combined with east bank Susitna Station sonar data for in-season assessment of escapement. Additional post-season estimates of escapement were available for Flathorn Station (approximately 2 mi downstream of Susitna Station counters) and Sunshine Station (river mile 80). In all cases, estimates are not considered absolute escapement counts for the river because of inherent problems in estimation techniques, and distribution of spawners into tributaries below and between enumeration sites.

The east bank site, although stable and conducive to sonar substrate placement, exhibited sector distribution problems noted in previous years (i.e., migration outside the counting range of the sonar did occur). An effort was made to quantify offshore migration by extending the counting range to 24 m and adjusting daily counts accordingly. This procedure improved escapement estimates to some degree, but did not account for mid-river migration past 24 m.

Sockeye Salmon:

Escapement estimates of 194,480 and 279,446 late run sockeye salmon were generated for the Susitna River in 1984 (Table 1). The lower value represented the apportioned sonar counts from Susitna Station east bank (Appendix Table 48) and Yentna Station (Appendix Table 49). The upper value

Table 18. Age composition of sockeye salmon collected in the Crescent River, 1979-1984.

Year	Percent Composition by Age Class							Sample Size	
	1.1	1.2	1.3	1.4	2.1	2.2	2.3		Other
1979 ^{1/}	tr	27.8	70.1			tr	tr	tr	643
1980 ^{1/}		6.5	86.9			2.9	1.6	2.1	511
1981 ^{1/}		8.2	32.1			9.6	49.9	tr	1,117
1982		12.9	79.2	.10		0.8	7.0		711
1983		10.9	42.2	0.2	0.7	27.4	18.6		731
1984		3.5	16.9			20.0	59.4	tr	780

^{1/} Percentages weighted by total numbers in escapement.

represented a combination of Yentna Station sonar counts and the Sunshine Station mark-recapture (Petersen) estimate (Barrett et al. 1985; Appendix Table 50). The Susitna Hydroelectric Project also enumerated an early run of sockeye salmon totaling 4,768 fish which reached a midpoint in migration (based on fishwheel catch) on 10 June at Sunshine Station (Barrett et al. 1985). The escapement goal for sockeye salmon established in 1979 is 200,000 late run fish (Tarbox et al. 1983). Additional sockeye salmon escapement estimates made for various points on mainstem Susitna River for the Susitna Hydroelectric Project are presented in Appendix Table 50.

Spawning ground surveys in index areas accounted for approximately 88,700 sockeye salmon (peak counts only; Table 19). Additional counts of sockeye salmon within the drainage conducted by various organizations enumerated nearly 5,700 sockeye salmon in other tributaries (Table 20). Counts within most tributaries were comparable in magnitude with previous years. An increase in total index area escapement relative to previous years is attributed to the placement of a weir (and complete enumeration of escapement) at the outlet of Larson Lake.

The midpoint and peak passage date of sockeye salmon past the Susitna Station east bank sonar counter was 19 July (Table 5), one day prior to the midpoint of the fishwheel catch (Appendix Table 51). Comparable midpoints were calculated from fishwheel catches at Flathorn Station (east bank - 22 July; west bank - 21 July) and Yentna Station (22 July, Barrett et al. 1985). Migration rates reported by Barrett et al. (1985) varied for peak to peak fishwheel catch (Flathorn to Yentna in one day and Flathorn to Sunshine in three to four days) and tagged fish recoveries (Flathorn to Yentna in three to four days and Flathorn to Sunshine in eight to nine days). Duration of sockeye salmon return into the Susitna River (defined as number of days to count 80% of the final escapement) was similar at Susitna Station (14 days; Table 21) and Yentna Station (16 days).

Evaluation of sector distribution information from Susitna Station east bank sonar counts indicated a poor inshore distribution throughout the period of enumeration as greater than 60% of the counts occurred in Sectors 7 through 12 (Figure 13 and Appendix Tables 52 and 53). In an effort to quantify fish migrating outside the standard 18 m counting range, the range was periodically extended to 24 m, and a ratio of counts within 18 m to counts within 24 m established. Data from this exercise indicated that approximately 32% of the fish targets enumerated were migrating between 18 m and 24 m from the transducer (Appendix Table 54). Hourly distribution of counts was relatively even throughout the day and consistent as the season progressed (Figure 13 and Appendix Tables 55 and 56).

A constant hourly passage rate was also observed at Yentna River with average proportion of counts by two hour blocks varying less than one percent from expected (8.3%) for the season (Figure 14 and Appendix Tables 57 through 60). Sector distribution data analysis of the south bank fish targets indicated 90.6% of the fish counted were within 6 m of the transducer (Figure 15 and Appendix Tables 57 through 60). North bank fish targets were more evenly distributed from shore to 18 m, however, no attempt was made to assess distribution outside the 18 m counting range.

Table 19. Peak sockeye salmon escaepment counts in Susitna River tributary index areas, 1973-1984.

Index Area	Year										
	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Byers Lake	1/	1/	50	300	1/	1/	1/	275	1/	1/	1/
Talachulitna River ^{2/}	6,186	5,105	13,210	25,935	14,308	11,696	21,125	9,926	14,560	9,590	27,736
Trinity-Movie Lakes	0	0	42	186	150	195	200	500	138	260	920
Shell Lake	20	251	344	247	127	1,480	5,800	6,050	3,150	2,811	8,600
Hewitt-Whiskey Lakes ^{3/}	1,047	751	2,289	792	1,998	1,205	3,250	9,850	2,675	3,425	6,593
Red Salmon Lake	160	142	376	372	235	480	1,100	1,212	1,000	150	142
Puntilla Lake	1/	1/	1/	2,100	1,105	90	550	200	1/	1/	1/
West Fork Yentna River	1/	1/	550	4,000	6,000	456 ^{4/}	5,500	9,000	10,340	9,660	6,350
Chelatna Lake ^{5/}	0	4	4/	171	0	0 ^{4/}	4,120	14,000	23,180	520	575
Fish Lake	95	187	82	611	299	100 ^{6/}	2,100	176	280	1/	191
Clear Creek ^{7/8/}	1/	1/	30	75	310	365	320	450	2,060	1,315	421
Stephan-Murder Lakes ^{9/}	115	261	462	539	1,142	140	220	475	452	1/	235
Larson Lake	19	63	85	330	117	160	1/	4,600	2,150	1,200	35,254 ^{10/}
Swan Lake ^{11/}	386	465	516	827	917	40 ^{6/}	4/	350	760	340	49
Red Shirt Lake ^{12/}	1	159	215	43	13	645	650	505	100	6,350	1,640
Susitna River Drainage											
Total Index Area											
Escapement ^{13/}	8,000	7,400	18,400	36,500	26,800	17,100	44,900	58,000	60,800	35,600	88,700

- 1/ No counts conducted
2/ Includes counts from Upper Talachulitna Creek, Talachulitna Lake, Talachulitna Creek, North and South Judd Springs, Judd Spring No. 2, Judd Lake, and Upper Talachulitna River Index Areas.
3/ Includes Hewitt Lake, Whiskey Lake, Hewitt Creek, Huckleberry Creek, and Christmas Tree Creek Index Areas.
4/ Glacially occluded.
5/ Includes Coffee Creek and Snowslide Creek Index Areas.
6/ Low visibility-turbid water.
7/ Known as Chunilna River in past reports.
8/ Includes Mama and Papa Bear Lakes Index Areas.
9/ Includes Prairie Creek Index Area.
10/ Cook Inlet Aquaculture Association weir count (Marcuson, pers. comm.).
11/ Includes Slim Creek and "T" Creek Index Areas.
12/ Includes Role Jo Creek Index Area.
13/ Rounded to the nearest 100 fish.

Table 20. Salmon escapement counts in Susitna River tributaries, 1984 ^{1/}.

Tributary	Count				
	Sockeye	Pink	Chum	Coho	Chinook
Alexander Creek					4,620 ^{2/}
Answer Creek				203 [/]	
Bunco Creek					51 ^{2/}
Byers Creek	109 ^{2/}	5,642 ^{2/}	141 ^{2/}	9 ^{2/}	39 ^{2/}
Cache Creek	12 ^{2/}	17 ^{2/}	28 ^{2/}	23 ^{2/}	
Caswell Creek	6 ^{2/}	121 ^{2/}	73 ^{2/}	102 ^{2/}	
Chase Creek		438 ^{2/}	1 ^{2/}	239 ^{2/}	3 ^{2/}
Cheechako Creek					29 ^{2/}
Chinook Creek					15 ^{2/}
Chulitna River ^{3/}					4,191 ^{2/}
Chunilna Creek (Clear Cr.)					1,520 ^{2/}
Clyde Creek		34 ^{2/}			
Deadhorse Creek		337 ^{2/}			
Deception Creek					675 ^{4/}
Deshka River					16,892 ^{2/}
Downunda Creek		6 ^{2/}			
Eightmile Creek	4,000 ^{5/}				
5th of July Creek		411 ^{2/}	2 ^{2/}		17 ^{2/}
Fish Creek (Yentna River)	100 ^{5/}	7,512 ^{2/}			
Fish Lake ^{6/}		20,000 ^{+7/}		234 ^{2/}	
Fog Creek					2 ^{2/}
4th of July Creek		1,842 ^{2/}	193 ^{2/}	8 ^{2/}	92 ^{2/}
Fromunda Creek		40 ^{2/}			
Gash Creek		6 ^{2/}		234 ^{2/}	
Gold Creek		82 ^{2/}			23 ^{2/}
Goose Creek	3 ^{2/}	312 ^{2/}	383 ^{2/}	31 ^{2/}	258 ^{2/}
Indian River		9,096 ^{2/}	2,247 ^{2/}	465 ^{2/}	1,456 ^{2/}
Jack Long Creek		14 ^{2/}	4 ^{2/}	6 ^{2/}	7 ^{2/}
Kashwitna River ^{8/}					111 ^{2/}
Lane Creek		1,184 ^{2/}	31 ^{2/}	24 ^{2/}	22 ^{2/}
Little Portage Creek		162 ^{2/}	18 ^{2/}		
Little Willow Creek	13 ^{2/}	748 ^{2/}	34 ^{2/}	10 ^{2/}	
Lower McKenzie Creek		585 ^{2/}	23 ^{2/}	24 ^{2/}	
Maggot Creek		107 ^{2/}			
Mama and Papa Bear Lakes		2,500 ^{7/}			
McKenzie Creek		11 ^{2/}			
Montana Creek		416 ^{2/}	61 ^{2/}	24 ^{2/}	2,309 ^{2/}
Moose Creek					541 ^{4/}
Peters/Martin Creek					324 ^{10/}
Portage Creek		2,707 ^{2/}	1,285 ^{2/}	128 ^{2/}	5,446 ^{2/}
Prairie Creek					9,000 ^{2/}
Question Creek				320 ^{2/}	
Rabideaux Creek				489 ^{2/}	620 ^{2/}
Red Salmon Lake		950 ^{7/}			
Sheep Creek	11 ^{2/}	66 ^{2/}	70 ^{2/}	21 ^{2/}	1,028 ^{2/}
Sherman Creek		48 ^{2/}	6 ^{2/}		
Skull Creek		121 ^{2/}	4 ^{2/}		
Slash Creek		3 ^{2/}		61 ^{2/}	
Sunshine Creek	71 ^{2/}	1,608 ^{2/}	49 ^{2/}	84 ^{2/}	14 ^{2/}
Susitna River ^{9/}	926	1,069	7,556		

-Continued-

Table 20. Salmon escapement counts in Susitna River tributaries, 1984 ^{1/}.

Tributary	Count				
	Sockeye	Pink	Chum	Coho	Chinook
Talachulitna River		6,000 ^{7/}			6,138 ^{2/}
Trapper Creek	200 ^{2/}	506 ^{2/}	59 ^{2/}	21 ^{2/}	
Troublesome Creek		4,474 ^{2/}	180 ^{2/}	14 ^{2/}	
Tulip Creek		8 ^{2/}			
West Fork Yentna River			591 ^{2/}	2 ^{2/}	
Whiskers Creek		293 ^{2/}		301 ^{2/}	67 ^{2/}
Whitsol Creek	20 ^{2/}			69 ^{2/}	
Willow Creek	220 ^{2/}	8,516 ^{2/}	332 ^{2/}	1,226 ^{2/}	2,789 ^{2/}

- ^{1/} Peak counts only. Not considered total escapement unless indicated.
^{2/} Data from Susitna Hydroelectric Project surveys (Barrett et al.).
^{3/} Middle fork only.
^{4/} Data from Sport Fish Division surveys (Bentz, pers. comm.).
^{5/} Data from Cook Inlet Aquaculture Association surveys (Marcuson, pers. comm.).
^{6/} Includes Birch Creek.
^{7/} Data from Commercial Fisheries Division surveys.
^{8/} North fork only.
^{9/} Peak survey counts of sloughs along Susitna River above Talkeetna (Barrett et al.).
^{10/} Data from Sport Fish Division surveys (Delaney, pers. comm.).

Table 21. Date of cumulative percent of sockeye salmon counts recorded in the Susitna River at Susitna Station, 1978-1984 1/2/.

Year	Date by 10% Interval									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% ^{3/}
1978	7/18	7/19	7/19	7/20	7/21	7/21	7/23	7/26	8/02	8/14
1979	7/20	7/21	7/21	7/22	7/22	7/22	7/24	7/26	7/28	8/30
1980	7/19	7/20	7/20	7/21	7/22	7/22	7/23	7/23	7/26	8/30
1981	7/11	7/14	7/15	7/16	7/17	7/19	7/21	7/23	7/27	8/22
1983	7/17	7/19	7/19	7/20	7/20	7/21	7/24	7/25	7/27	8/08
1984 ^{4/}	7/17	7/17	7/18	7/19	7/19	7/20	7/23	7/26	7/30	8/08

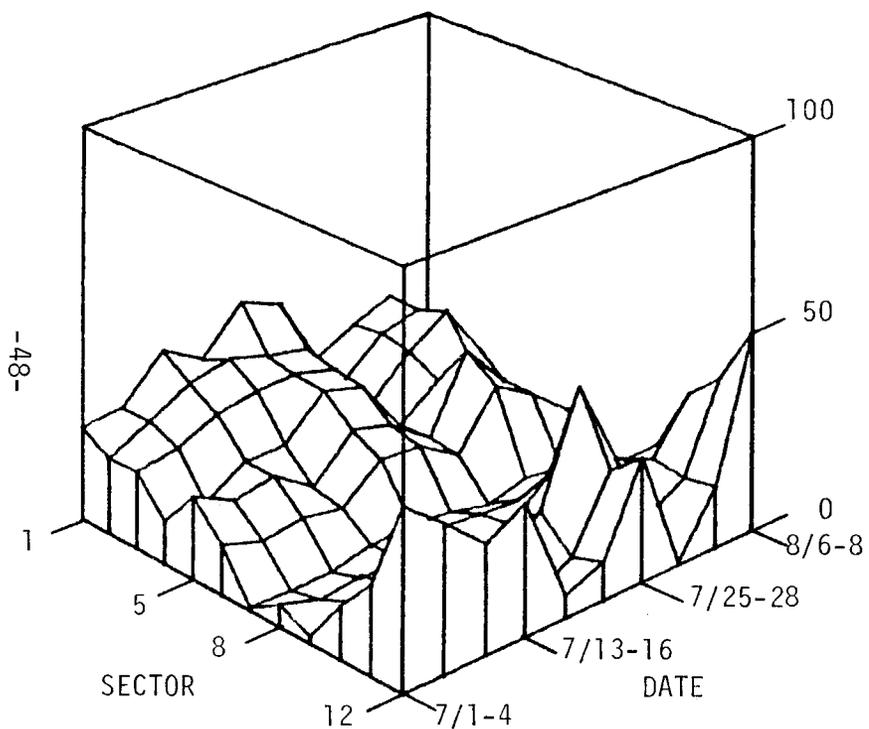
1/ Date on which percentage levels equaled or exceeded.

2/ 1982 run timing information unavailable due to mid-season data loss.

3/ 100% date denotes last day of operation.

4/ Counts from east bank Susitna River only.

SECTOR DISTRIBUTION



HOURLY DISTRIBUTION

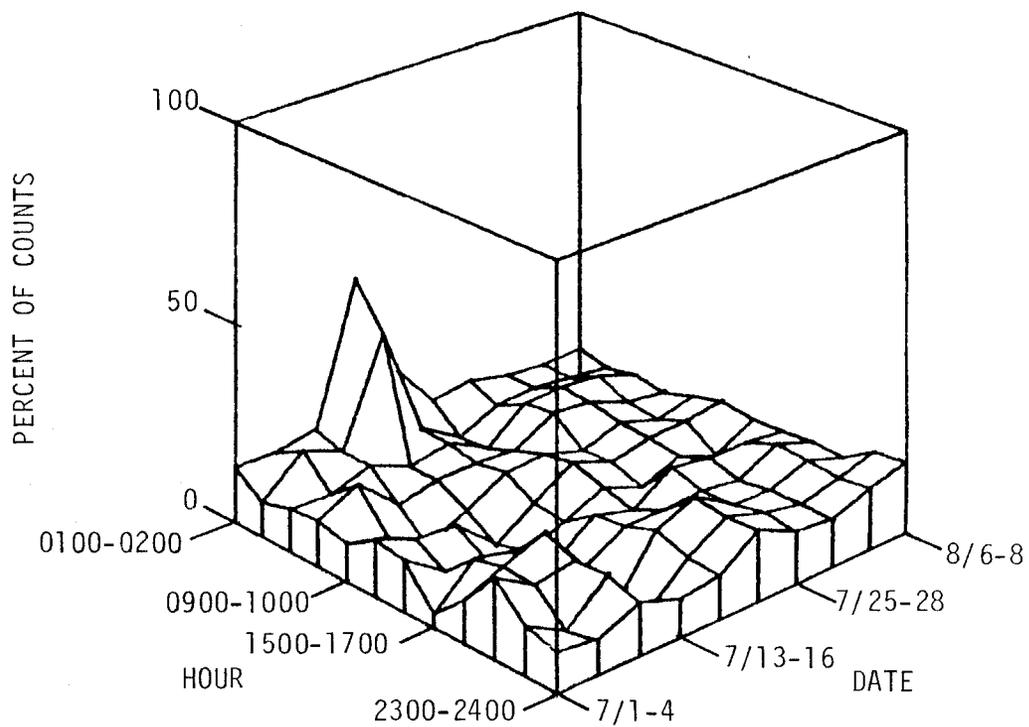
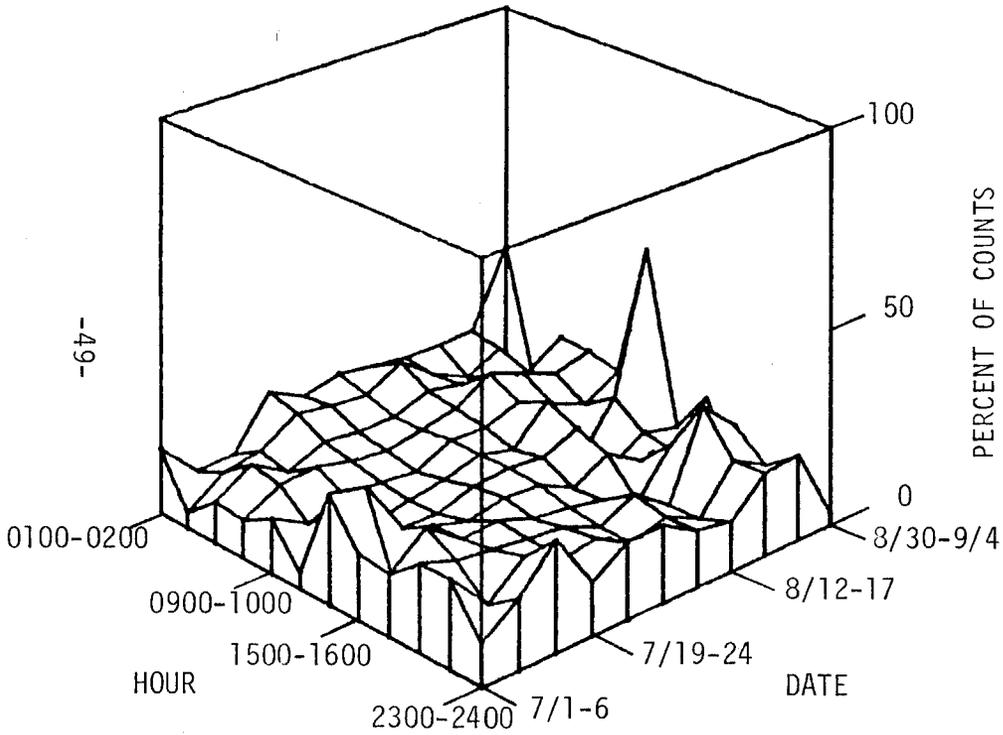


Figure 13. Susitna River (Susitna Station) east bank side-scan sonar count hourly (two-hour increments) and sector distribution over time, 1 July - 8 August 1984 (data grouped in four-day time periods).

NORTH BANK



SOUTH BANK

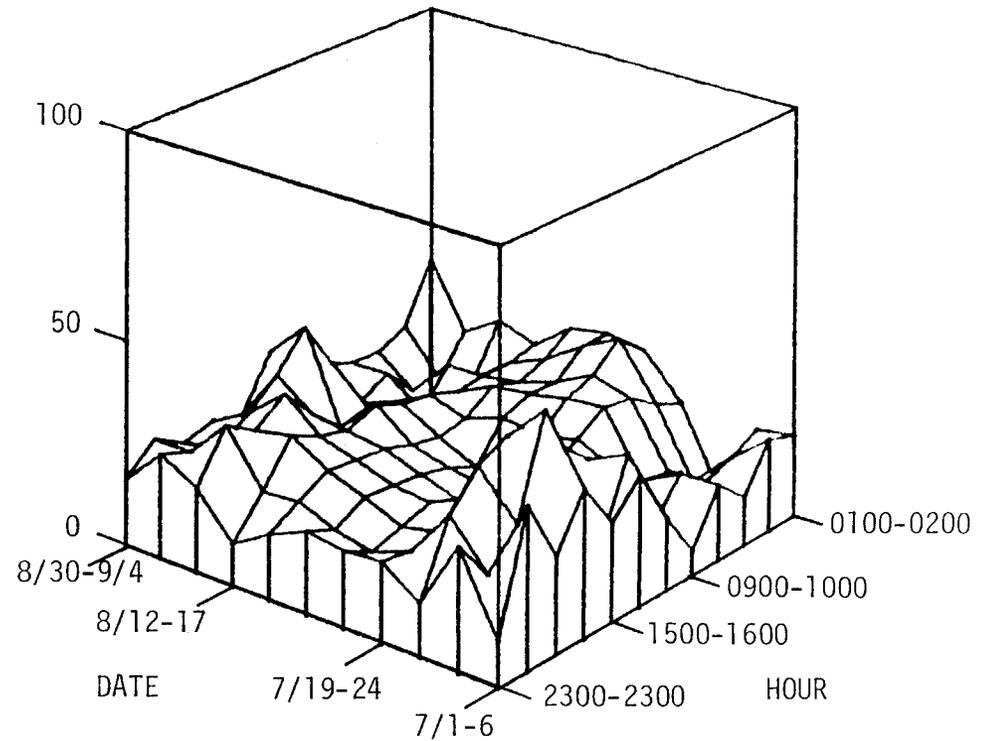


Figure 14. Yentna River side-scan sonar count hourly distribution over time (two-hour increments grouped in six-day time periods), 1 July - 4 September 1984.

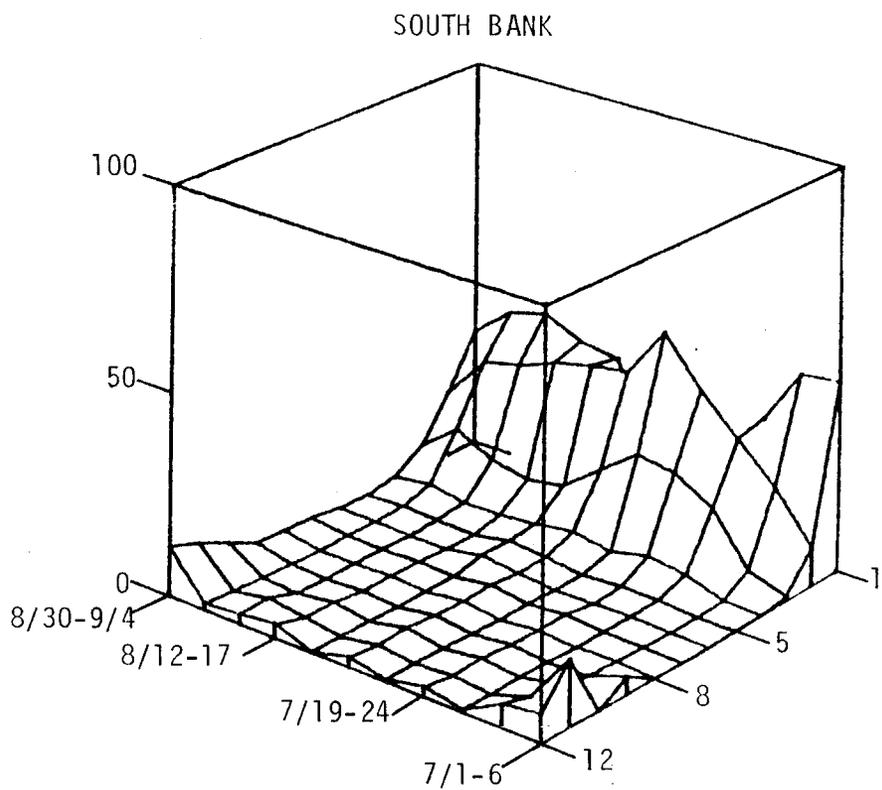
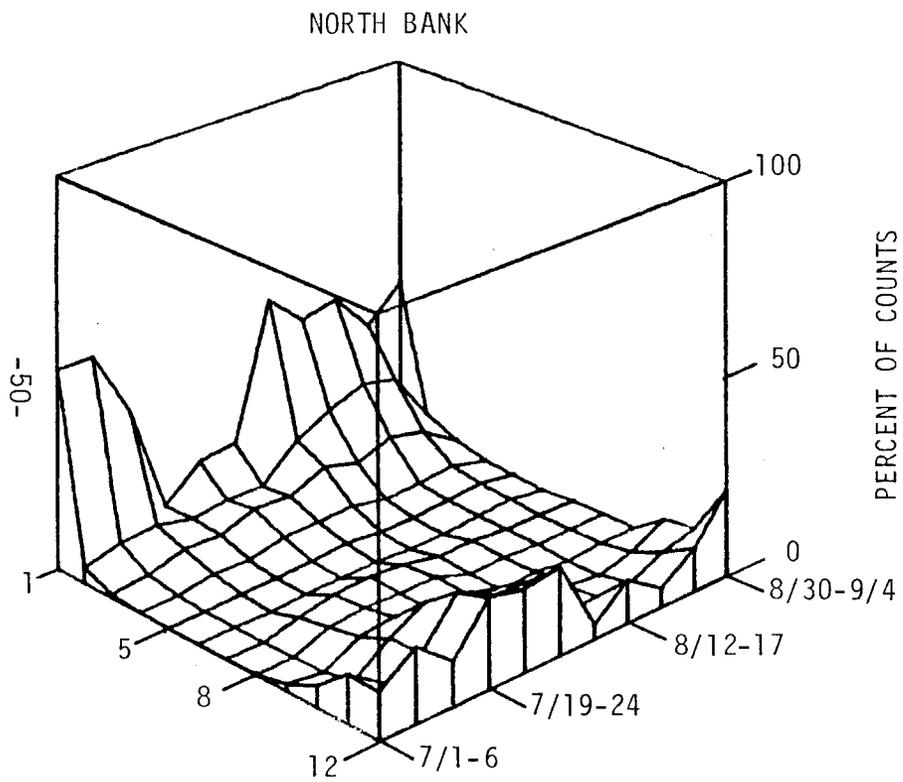


Figure 15. Yentna River side-scan sonar count sector distribution over time (grouped in six-day time periods), 1 July - 4 September 1984.

Fishwheel catches at Susitna Station are summarized in Appendix Table 51. Age composition analysis revealed no difference in results for the major age classes tested (1.2, 1.3) by method (Table 22). However, inadequate sample size by period in Method II precluded assessment of seasonal change in age composition. Results from Method I were selected to represent the escapement age composition. Age 1.2 sockeye salmon were the dominant age class in Susitna Station samples (41.7%) followed by age 1.3 (33.7%) and 2.2 (11.6%) fish (Table 23). Four-year old fish also dominated age class samples at Sunshine Station (Barrett et al. 1985). Average length and weight data compiled by sex and age class, and ratio of males to females are presented in Appendix Tables 65 and 66.

The majority of fish sampled at Yentna Station from 19 July through 24 July (797 samples) were age 1.3 (49.7%) and 1.2 (23.5%; Table 24). These results are comparable to age composition samples taken at Flathorn Station (Barrett et al. 1985).

Pink Salmon:

The in-season pink salmon escapement estimate at Susitna Station in 1984 was 746,724. The estimate consisted of apportioned sonar counts from Yentna Station (Appendix Table 49) and Susitna Station east bank (Appendix Table 48). Post season mark/recapture calculations by Susitna Hydroelectric Project personnel generated estimates of 3,629,857 fish at Flathorn Station and 1,017,022 fish at Sunshine Station (Appendix Table 50). Results of enumeration efforts at additional Susitna Hydroelectric sites are also presented in Appendix Table 50.

Spawning ground survey estimates accounted for approximately 78,000 pink salmon in selected streams within the drainage (Table 20). Comprehensive surveys were conducted only on tributaries and side sloughs of the Susitna River above Talkeetna (Barrett et al. 1985). Remaining counts were obtained in conjunction with surveys of sockeye salmon spawning grounds and do not reflect pink salmon peak spawning periods or major spawning grounds.

The daily pink salmon count on the east bank at Susitna Station peaked on 29 July, the same day as the midpoint of the total apportioned pink salmon count (Appendix Table 48). Eighty percent of the fish targets attributed to pink salmon were recorded in 12 days (Table 25). Migration midpoint (as measured by fishwheel catch) was 28 July at Flathorn and Yentna Stations (Yentna Station sonar counts reached the midpoint on 27 July). Past studies have noted an approximate one week difference in run timing between even and odd years (Tarbox et al. 1981). The 1984 escapement into the Susitna River appeared to follow this pattern. Mean travel time of tagged pink salmon between Flathorn Station and Yentna Station was approximately three days (Barrett et al. 1985).

A total of 274 pink salmon were sampled for length, weight, and sex data at Susitna Station. Results are presented in Appendix Tables 67 and 68.

Table 22. Comparison of two methods of determining age composition of sockeye salmon collected in the Susitna River at Susitna Station, 1984.

Method	Percent Composition by Age Class ^{1/}									Sample Size
	0.2	1.1	0.3	1.2	2.1	1.3	2.2	2.3	2.4	
I ^{2/}	0.3	1.0	3.6	41.7 (7.5)	0.5	33.7 (8.0)	11.6	7.3	0.3	397
II ^{3/}	0.2	1.0	3.6	42.2 (7.5)	0.5	33.6 (8.1)	11.5	7.1	0.3	397

^{1/} 95% confidence interval in parentheses.

^{2/} Method I - All age composition samples grouped together; age composition not weighted to numbers in escapement.

^{3/} Method II - Combined, weighted age compositions from three periods using data from all dates within each period.

Table 23. Age composition of sockeye salmon collected in the Susitna River at Susitna Station, 1975-1984.

Seasonal Summary	Percent Composition by Age Class										Sample Size
	0.2	1.1	0.3	1.2	2.1	1.3	2.2	1.4	2.3	2.4	
1975 ^{1/}				57.8	tr	38.4	2.8		tr		498
1976 ^{1/}				47.9		49.4	1.7		tr		1,046
1977 ^{1/}				22.0	tr	73.8	3.5		tr		1,450
1978		3.7		48.2	8.0	36.0	2.5		1.5		767
1979 ^{2/}		4.5		61.0	1.4	20.6	5.3		1.0		830
1980 ^{2/}				50.0		36.2	4.7		5.2		823
1981 ^{2/}				8.9		83.0	3.0		4.5		2,233
1982		2.3		23.5	0.5	59.6	3.3		10.7		1,032
1983	3.1	0.2	4.9	55.1	0.5	23.6	9.2	0.2	2.9	0.3	1,899
1984 ^{3/}	0.3	1.0	3.6	41.7	0.5	33.7	11.6		7.3	0.3	397

^{1/} Precocious males, age 32, were excluded from the analysis since a representative sample of this age class was not taken each year.

^{2/} Percentages weighted by total numbers in escapement.

^{3/} Samples from east bank Susitna River only.

Table 24. Age composition of sockeye salmon collected in the Yentna River, 1984.

Seasonal Summary	Percent Composition by Age Class										Sample Size
	0.2	1.1	0.3	1.2	2.1	1.3	2.2	1.4	2.3	2.4	
1984	0.4	0.1	2.3	23.5	0.1	49.7	9.6		14.3		797 ^{1/}

^{1/} Samples taken 19 July through 24 July only.

Table 25. Date of cumulative percent of pink salmon counts recorded in the Susitna River at Susitna Station, 1978-1984.^{1/2/3/}

Year	Date by 10% Interval									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1978	7/21	7/23	7/24	7/25	7/26	7/27	7/29	7/31	8/02	8/13
1979	7/15	7/19	7/20	7/22	7/23	7/24	7/26	7/27	7/29	8/29
1980	7/25	7/28	7/29	7/30	7/31	8/01	8/03	8/04	8/06	8/29
1981	7/16	7/21	7/23	7/24	7/25	7/26	7/28	7/29	8/02	9/02
1983	7/17	7/19	7/19	7/20	7/20	7/21	7/24	7/25	7/27	8/08
1984 ^{4/}	7/21	7/24	7/26	7/28	7/29	7/29	7/30	7/31	8/01	8/08

^{1/} Date on which percentage level equaled or exceeded.

^{2/} 100% date denotes last day of operation.

^{3/} 1982 run timing information unavailable due to mid-season data loss.

^{4/} Samples from east bank Susitna Station only.

Chum Salmon:

Estimates of chum salmon escapement into the Susitna River varied from 48,204 (combined Yentna Station and Susitna Station apportioned sonar counts) to 812,694 fish (Flathorn Station mark/recapture estimate; Barrett et al. 1985). The latter estimate compares favorably with the combined Yentna Station/Sunshine Station total (764,958) which has been used to estimate the escapement the previous two years (King and Tarbox 1984). Escapement estimates from additional selected sites on the Susitna River above Talkeetna are presented in Appendix Table 50.

Spawning ground surveys accounted for 13,371 chum salmon within the Susitna River drainage (Table 20). As with pink salmon, comprehensive enumeration efforts on spawning grounds are limited to the Susitna River above Talkeetna (Barrett et al. 1985).

Complete migratory timing information for chum salmon was not available from Susitna Station due to cessation of enumeration activities in early August. At Flathorn Station, chum salmon were captured over a 41-day period, peaking on 25 July and 29 July for the east and west channel fishwheels, respectively (Barrett et al. 1985). Shore orientation and hourly distribution data for chum salmon were essentially masked during peak sonar counting periods in July by more abundant species.

A total of 201 chum salmon was sampled for age, length, weight, and sex characteristics at Susitna Station. The proportion of samples by age class was 80% age 0.3 fish, 14% age 0.4 fish, and 6.0% age 0.2 fish (Table 26). Comparable age class proportions were found in Yentna and Flathorn Station fishwheel catches (Barrett et al. 1985). Length and weight characteristics by age class and sex, and the ratio of males to females are presented in Appendix Tables 69 and 70.

Coho Salmon:

Estimates of coho salmon escapement into the Susitna River ranged from 31,585 (combined Yentna Station and Susitna Station apportioned sonar counts) to 190,061 (Flathorn Station mark/recapture estimate, Barrett et al. 1985). Estimates of escapement from additional Susitna Hydroacoustic Project sites on the Susitna River are presented in Appendix Table 50. Spawning ground survey data compiled to date enumerated only 4,189 coho salmon (Table 20) although extensive surveys were conducted only on the Susitna River and its tributaries above the Talkeetna River confluence.

As with chum salmon, migratory timing information at Susitna Station was precluded by cessation of sonar enumeration efforts in early August. In addition, the relative abundance of other species migrating concurrent to coho salmon during peak periods effectively masked migratory behavior data collected by sonar for this species. The midpoint of migration for Flathorn Station east channel and west channel, and Yentna Station fishwheels was 29 July, 25 July, and 3 August, respectively (Barrett et al. 1985).

Seventy-six coho salmon were sampled for age, weight, length, and sex characteristics at Susitna Station in 1984. The proportion (Table 27) of age

Table 26. Unweighted age composition of chum salmon collected in the Susitna River at Susitna Station, 1975-1984.

Year	Percent Composition by Age Class				Sample Size
	0.2	0.3	0.4	0.5	
1975	9.8	88.3	2.0	0	613
1976	17.2	68.1	14.6	0	267
1977	9.1	86.5	4.3	tr	927
1978	18.7	52.6	28.3	0.4	963
1979	5.1	90.5	4.3	0	391
1980	38.0	49.3	12.7	0	71
1981	1.9	90.9	7.1	0	154
1982	5.3	83.2	11.5	0	340
1983	0	55.0	45.0	0	131
1984	6.0	80.0	14.0	0	201

Table 27. Unweighted age composition of coho salmon collected in the Susitna River, 1975-1984.

Year	Percent Composition by Age Class						Sample Size
	1.1	2.0	2.1	3.0	2.2	3.1	
1975	24.4	0	75.6	0	0	0	406
1976	4.5	0	93.5	0	0.2	1.7	418
1977	8.5	0	90.8	0	0.1	0.6	1,112
1978	28.2	0	71.7	0	0	0.1	773
1979	21.5	3.0	74.1	1.0	0	0.3	297
1980	17.6	2.7	72.9	0	0	6.9	336
1981	13.1	tr	81.4	0	0	5.0	221
1982	22.0	0	74.4	0	0	3.6	305
1983	26.7	0	67.2	0	0	6.1	235
1984	29.9	0	67.5	0	0	2.6	76

2.1 fish (67.5%) to age 1.1 fish (29.9%) was similar to that found at Susitna Hydroelectric Project sites (Barrett et al. 1985). Length and weight characteristics by age class and sex, and the ratios of males to females are presented in Appendix Tables 71 and 72.

Chinook Salmon:

Chinook Salmon escapement estimates have not been undertaken at Susitna Station since 1978. Migratory behavior not conducive to enumeration by side-scan sonar, and early run timing in comparison to other salmon species are the primary reasons for the lack of an enumeration program. The Petersen mark/recapture program conducted at Sunshine Station resulted in an estimate of 117,128 fish (Barrett et al. 1985). An additional 4,596 jack chinook salmon (defined as less than 350 mm in length) were estimated to have passed the station for a total chinook salmon estimate at Sunshine Station of 121,724 fish (Barrett et al. 1985). Stream survey information compiled to date identified 58,314 chinook salmon in selected tributaries (primarily below Sunshine Station) in the Susitna River drainage (Table 20). Petersen mark/recapture estimates were also obtained for Talkeetna and Curry Stations on the Upper Susitna River (Appendix Table 50). Migratory timing, age, weight, and length information for Susitna Hydroelectric project sites are found in Barrett et al. (1985).

Evaluation of Data:

Data from various studies conducted on the Susitna River indicate that, in general, chum salmon, coho salmon, and chinook salmon do not exhibit strong inshore orientation in the lower Susitna and Yentna Rivers. Therefore, only that component of the escapement migrating within 18 m of the shore at the respective sonar sites will be included in the total fish target counts. Additionally, various siting criteria (King 1984) must be met to insure that even normally shore oriented species (sockeye salmon and pink salmon) move through the hydroacoustic beam during migration. Failure to meet these criteria can result in undercounting.

From 20 through 24 July 1984, a series of preliminary tests were conducted at Susitna Station to evaluate the potential applications of a new side scanning sonar unit designed (by Bendix Corporation) to operate without a substrate and at counting ranges up to 150 m (King, in press). When the counting range from shore was 44 m on the new unit and 21 m on the existing side scan unit, approximately 43% of the recorded fish targets were offshore further than 21 m. When the counting range on the existing counter was expanded to 28 m from shore, an estimated 10% of the counts recorded by the long range counter were offshore of 28 m. Comparison of counts from the bottom to counts in the upper water column indicated that a minimum of 5% of the fish passing the east bank were probably above the area ensonified by the existing side scan sonar counter.

Accuracy of apportioned sonar counts can also be affected by differences in migratory behavior between species which results in problems in apportioning total fish targets based on fishwheel catches. That is, fish that cross the substrate in the outer sectors may not be subject to fishwheel capture, resulting in apportioned fish targets being biased toward those species which exhibit the strongest inshore preference. The degree to which these factors

affect the accuracy of apportioned fish targets by species is dependent yearly onshore orientation and run strength of each species relative to the others. Other factors such as fishwheel location and efficiency will also influence the fish target apportioning process.

Assessment of escapement estimates should also include some evaluation of factors affecting accuracy of mark/recapture estimates. Several assumptions must be met in any mark/recapture estimate (Jones 1977, Ricker 1958, Jones 1976). The effects of violating these assumptions can be to over or underestimate the population size although in general most errors result in overestimation. In the absence of adequate studies to measure sources of error which result in assumption violations, the potential error in a population estimate cannot be quantified. However, numerous studies have been done which compare mark/recapture estimates to total counts obtained from other methods (generally weir counts). It is apparent from this literature that mark/recapture estimates generally vary from actual escapement, and are nearly always an overestimation (Brett 1952, Lister et al. 1931, Simpson 1984).

Finally, using reported escapements as estimates of total spawners in the Susitna River is complicated by the fact that it is not known what proportion of each species escapement spawns between and below established enumeration sites.

Significantly different escapement estimates generated by different gear types, and questions relative to disadvantages of each gear type imply that reported escapement estimates may not reflect actual escapement. Further, lack of complete analysis and documentation of factors which affect escapement estimates suggest that there is no valid way of determining the accuracy of existing estimation techniques in the Susitna River.

Upper Cook Inlet Minor Systems

Escapement estimates for various Upper Cook Inlet rivers (Figure 16) not regularly monitored by Commercial Fisheries Division staff are summarized in Table 28. Additional detail is provided for systems where an effort was made to quantify total escapement, or where index areas have been established to provide relative year to year comparative data.

Big River:

A series of seven aerial overflights were conducted at seven to 14-day intervals from 11 July through 5 September. Data from clearwater tributaries was analyzed via the area under the curve method (Nielson and Geen 1981) and combined with peak counts from the outlets of Wolverine and Martin Lakes to establish a minimum escapement estimate of 25,099 sockeye salmon (Table 29). Peak counts of 820 pink salmon and 3,280 coho salmon were also noted. Age composition of fish sampled in the drainage is presented in Table 30.

McArthur/Chakachatna River:

Seven aerial overflights were conducted from 29 July through 28 September 1984. Counts from clearwater spawning areas were used to estimate escapement of sockeye salmon by the area under the curve method (Table 31). The

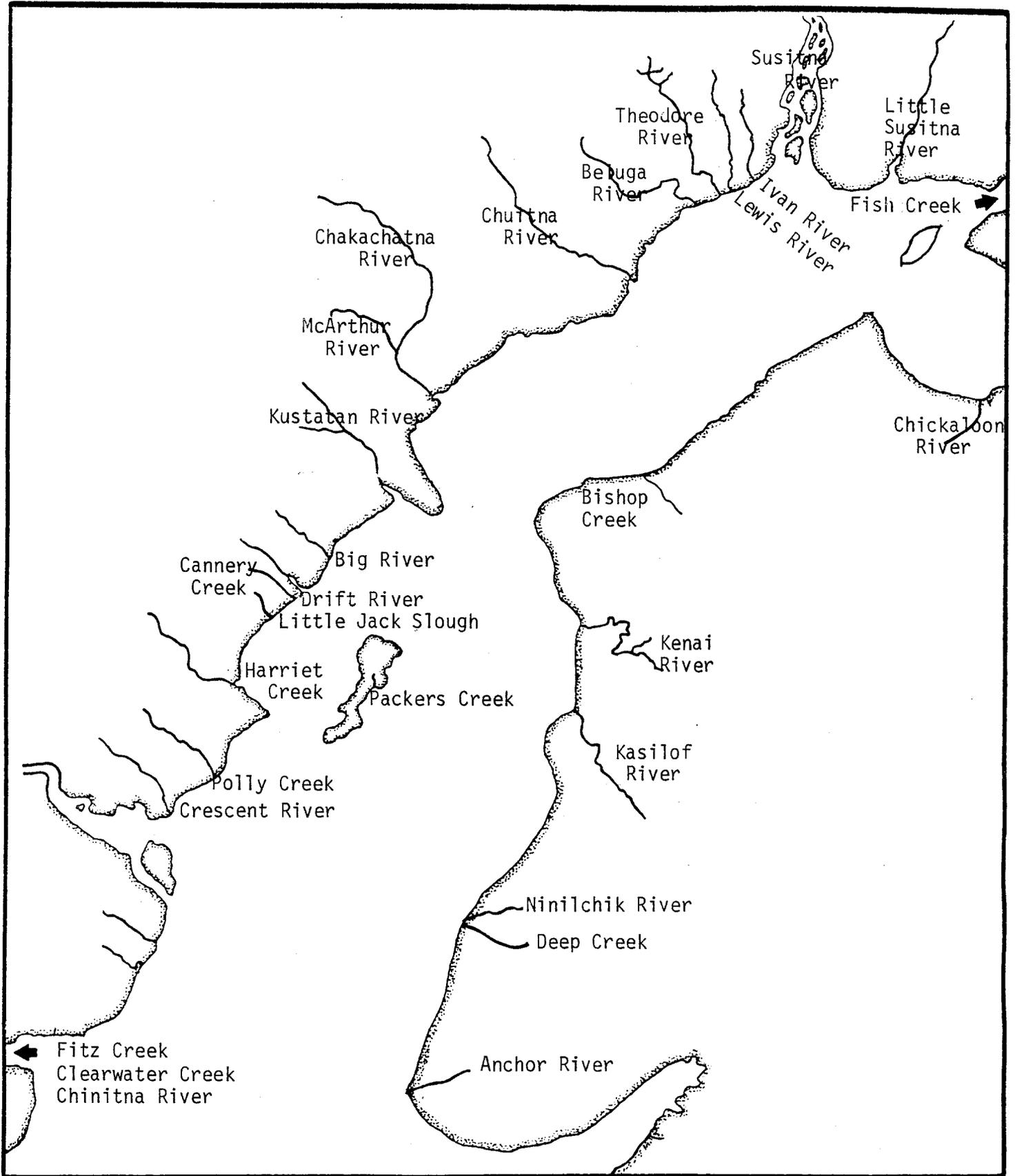


Figure 16. Anadromous streams of Upper Cook Inlet, Alaska.

Table 28. Salmon escapement observations in selected Upper Cook Inlet anadromous streams, 1984 ^{1/}.

Stream	Method	Number of Fish Observed or Estimated				
		Sockeye	Pink	Chum	Coho	Chinook
Fitz Creek ^{2/}	Aerial Count			330		
Clearwater Creek ^{2/}	Aerial Count			9,600		
Chinitna River ^{2/}	Aerial Count			390		
Little Jack Slough ^{3/4/}	Aerial Count	5-10,000			1-2,000	
Cannery Creek ^{3/}	Aerial Count				330	
Drift River ^{3/}	Aerial Count		120		12	
Big River ^{2/}	Aerial Count		820		3,280	
Chakachatna River - McArthur River ^{2/}	Aerial Count	87,083	1,985	1,133	740	
Chuitna River ^{6/}	Aerial Count		9,775	1,900-2,500		3,103
Threemile Creek ^{3/}	Aerial Count	20,000				
Drill Creek ^{3/}	Aerial Count					8,000
Coal Creek	Aerial Count	9,455 ^{2/}				400 ^{3/}
Theodore River ^{6/}	Aerial Count					1,251 ^{5/}
Lewis River ^{3/}	Aerial Count					5-7,000
Little Susitna River ^{7/}	Ground Count			2,666		
Nancy Lake ^{2/}	Aerial Count	8,900				
Fish Creek ^{8/}	Weir Count	192,352	830	4,510		
Chickaloon River ^{9/}	Aerial Count	473	50,000			831
Mystery Creek ^{9/}	Aerial Count	784				155
Bishop Creek ^{3/}	Aerial Count	11,433				
Ninilchik River ^{10/}	Aerial Count					600
Deep Creek ^{10/}	Aerial Count					380
Anchor River ^{10/}	Aerial Count					1,170
Packers Lake ^{3/}	Weir Count	30,864				

1/ Aerial and ground counts are not considered to be total escapement counts unless indicated.

2/ ADF&G Commercial Fisheries Division surveys.

3/ Cook Inlet Aquaculture Association surveys (Marcuson, pers. comm.).

4/ Includes Blue (Elling) Lake.

5/ Environmental Research and Technology (1985).

6/ Delaney, pers. comm.

7/ Engel, pers. comm.

8/ Chlupach, pers. comm.

9/ Dean, pers. comm.

10/ Hammarstrom et al. 1985.

Table 29. Results of stream surveys conducted on sockeye salmon spawning tributaries of the Big River drainage, 1984.

Location	Date							Average Stream Life Used
	7/11	7/19	7/25	8/06	8/19	8/28	9/05	
North Fork Tributaries	52	90	233	56	241	11		12
South Fork Tributaries	46	2,211	3,439	1,530	385	260		12
Woverine L. Outlet ^{1/}	5,000	5,000	5,000	600	10,000	500		--
Martin L. Outlet ^{2/}	0	0	0	0	2,500	1,000	2,000	--

^{1/} Peak counts only (7/19 and 8/19) used in estimating escapement.

^{2/} Peak count only (8/19) used in estimating escapement.

Table 30. Age composition of sockeye salmon collected in Big River, 1982-1984.

Year	Tributary	Percent Composition by Age Class										Sample Size
		0.2	1.1	0.3	1.2	2.1	1.3	2.2	1.4	2.3	3.2	
1982 ^{1/}	Mainstem		1.9	0.7	15.9	2.2	28.2	32.3		11.7	0.2	967
1983 ^{2/}	Mainstem	0.3	1.1	0.3	26.6	0.8	60.0	8.8	0.1	1.9	0.1	2,741
	Wolverine Cr.		0.4		38.2		7.5	40.0		13.9		280
1984	Wolverine Cr.				4.5	0.9	10.8	72.7		11.1		352
	South Fork		5.1		28.3		40.6	3.6	0.7	21.7		138

^{1/} Cook Inlet Aquaculture Association 1982.

^{2/} Marcuson 1984.

Table 31. Results of stream surveys conducted on sockeye salmon spawning tributaries of the McArthur/Chakachatna rivers drainage, 1984.

Location	Date									Average Stream Life Used
	7/29	8/05	8/10	8/27	8/29	9/05	9/06	9/11	9/28	
Faro's Lake	725	600	350	11						6
13U Creek	269	190	179	6						6
12.1 Creek	3,284	3,821	2,603	31						6
12.2 Creek	1,821	1,284	1,134	18						6
12.3 Creek	1,433	1,761	1,075	18						6
Chakachatna R. Sloughs			95		285	825			263	12
Igitna River					1,800		1,500		200	12
Chilligan River					23,300		32,932	36,031	2,820	12

calculated escapement of sockeye salmon in clearwater spawning areas was 87,083 fish (60,631 in Chilligan River). Peak counts of 1,985 pink salmon, 1,133 chum salmon and 740 coho salmon were also recorded. Age composition of fish sampled in the drainage is presented in Table 32.

Chuitna River:

Salmon escapement into the Chuitna River was estimated by aerial counts as part of an environmental baseline study for the Diamond Shamrock-Chuitna Coal Joint Venture. Peak counts for the drainage were 3,103 chinook salmon, 1,900-2,500 coho salmon, and 9,775 pink salmon (Environmental Research and Technology, Inc. 1985).

Fish Creek (Big Lake):

Salmon enumeration was accomplished primarily through a weir operated below Big Lake. Final escapement counts were 192,352 sockeye salmon and 4,510 coho salmon (Chlupach, pers. comm.). Daily escapement for 1984, historic yearly totals, AWL data, and migratory timing information for sockeye salmon spawning in this drainage are presented in Table 33, Appendix Table 73, Table 34, and Appendix Table 74, respectively.

South Kenai Peninsula Streams:

Aerial surveys are conducted annually on the Anchor River, Deep Creek, and Ninilchik River by Sport Fish Division staff. Reported chinook salmon escapements in 1984 were 1,170, 380, and 600 fish, respectively (Hammarstrom et al. 1985).

Packers Lake (Kalgin Island):

A total of 30,864 sockeye salmon were counted through a weir established below the outlet of Packers Lake (Marcuson, pers. comm.).

Table 32. Age composition of sockeye salmon collected in the McArthur/Chakachatna River drainage, 1983-1984.

Year	Tributary	Percent Composition by Age Class								Sample Size
		0.2	0.3	1.2	2.1	1.3	2.2	1.4	2.3	
1983	McArthur R.	1.2	6.2	34.0		54.6	1.2		2.8	244
	Chilligan R.			2.9	2.0	37.7	17.8	0.1	39.5	758
1984	McArthur R.	0.7	3.7	24.8		67.5	1.5		1.8	592
	Chilligan R.			1.2		9.2	8.0		81.6	598

Table 33. Fish Creek sockeye salmon escapement, Big Lake drainage, 1936-1984.

Year	Dates	Methods	Total Number of Sockeye Salmon
1936	7/15-8/11	Weir	203,039
1937	7/21-8/09	Weir	50,617
1938	7/10-8/08	Weir	182,463
1939	7/11-8/12	Weir	116,588
1940	7/04-8/12	Weir	306,982
1941	7/04-8/09	Weir	55,077
1942-45	No actual counts conducted		
1946		Est. ground count	57,000
1947		Est. ground count	150,000
1948		Est. ground count	150,000
1949	7/09-8/17	Weir	68,240
1950	7/09-8/17	Weir	29,659
1951	7/04-8/16	Weir	34,704
1952	7/12-8/09	Weir	92,724
1953	7/11-8/05	Weir	54,343
1954	7/13-8/09	Weir	20,904
1955	7/08-8/08	Weir	32,724
1956	7/08-7/31	Weir	32,663
1957	7/12-8/25	Weir	15,630
1958	7/04-7/28	Weir	17,573
1959	7/10-8/02	Counting Screen	77,416
1960	7/04-7/31	Counting Screen	80,000
1961	7/04-7/31	Counting Screen	40,000
1962	7/04-7/31	Counting Screen	60,000
1963	7/04-8/01	Counting Screen	119,024
1964	7/04-7/31	Counting Screen	65,000
1965	7/04-8/08	Counting Screen	16,544
1966	7/05-7/31	Counting Screen	41,312
1967	7/03-7/31	Counting Screen	22,624
1968	7/01-7/31	Counting Screen	19,616
1969	7/04-9/02	Weir	12,456
1970	7/04-8/08	Weir	25,000
1971	7/03-8/07	Weir	32,000
1972	7/02-9/08	Weir	6,981
1973	7/01-9/06	Weir	2,705
1974	7/07-9/06	Weir	16,225
1975	7/03-9/11	Weir	29,882
1976	7/05-9/10	Weir	14,032
1977	7/05-8/15	Weir	5,292
1978		Weir	3,555
1979	7/09-8/25	Weir	68,739
1980	7/04-8/27	Weir	62,628
1981	7/09-9/03	Weir	50,479
1982	7/12-9/08	Weir	28,164
1983	7/05-8/30	Weir	118,797
1984	6/29-9/19	Weir	192,352

Table 34. Date of cumulative percent of sockeye salmon counts recorded in Fish Creek, 1980-1984 1/2/.

Year	Starting Date	Date of 10% Interval									
		10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1980	7/04	7/19	7/21	7/22	7/23	7/23	7/24	7/25	7/25	7/28	8/27
1981	7/09	7/12	7/14	7/15	7/15	7/16	7/18	7/19	7/22	7/27	8/23
1982	7/12	7/21	7/22	7/23	7/24	7/25	7/27	7/28	7/30	8/08	9/08
1983	7/11	7/21	7/22	7/23	7/24	7/25	7/26	7/28	7/31	8/04	
1984	6/29	7/19	7/21	7/23	7/24	7/25	7/26	7/28	8/01	8/07	9/19

1/ Date on which percentage level equaled or exceeded.

2/ 100% date denotes last day of operation.

LITERATURE CITED

- Barrett, B.M., F.M. Thompson, and S.N. Wick. 1985. Adult anadromous fish investigations. Alaska Department of Fish and Game Susitna Hydro Aquatic Studies Report No. 1. (In press).
- Bentz, R. 1985. Personal communication. Alaska Department of Fish and Game, Sport Fish Division, Palmer, Alaska, U.S.A.
- Bernard, D.R. 1983. Statewide standards for sampling fish populations for age composition. Alaska Department of Fish and Game, Attachment No. 8 (mimeo). 4 pp.
- Bethe, M.L., P.V. Krasnowski, and S.L. Marshall. 1980. Origins of sockeye salmon in the Upper Cook Inlet fishery of 1978 based on scale pattern analysis. Alaska Department of Fish and Game, Informational Leaflet No. 186. 45 pp.
- Brett, R. Jr. 1952. Skeena River sockeye escapement and distribution. Journal Fisheries Research Board of Canada, 8(7):453-468.
- Browning, R. 1985. Personal communication. United States Department of Agriculture, Forestry Service, Seward, Alaska, U.S.A.
- Chlupach, R. 1985. Personal communication. Alaska Department of Fish and Game, Fisheries Rehabilitation, Enhancement, and Development Division, Palmer, Alaska, U.S.A.
- Cochran, W. 1977. Sampling techniques. 3rd Edition. John Wiley and Sons, Inc. New York. 428 pp.
- Cook Inlet Aquaculture Association. 1982. Big River Lakes pre-enhancement investigation, 1982. Unpublished manuscript. 28 pp.
- Cross, B. Personal communication. 1985. Alaska Department of Fish and Game, Commercial Fisheries Division, Anchorage, Alaska.
- Cross, B.A., D.R. Bernard, and S.L. Marshall. 1983. Recruits-per-spawner ratios for sockeye salmon of Upper Cook Inlet, Alaska. Alaska Department of Fish and Game, Informational Leaflet No. 221. 82 pp.
- Davis, A.S., T. Namtvedt, and B.M. Barrett. 1973. Cook Inlet sockeye forecast and optimum escapement studies. Annual Technical Report, 1972 Field Season. 94 pp.
- Dean, J. Personal communication. 1985. United States Department of the Interior, Fish and Wildlife Service. Soldotna, Alaska, U.S.A.

LITERATURE CITED (Continued)

- Delaney, K. Personal communication. 1985. Alaska Department of Fish and Game. Sport Fish Division, Anchorage, Alaska, U.S.A.
- Engel, L. Personal communication. 1985. Alaska Department of Fish and Game, Sport Fish Division, Palmer, Alaska, U.S.A.
- Environmental Research and Technology. 1985. Diamond Chuitna Project mine component aquatic baseline report. Prepared for Diamond Shamrock-Chuitna Coal Joint Venture.
- Flagg, L.B. 1984. Central Cook Inlet F.R.E.D. Division 1984 Annual Report. Alaska Department of Fish and Game, unpublished manuscript. 34 pp.
- Hammarstrom, S.L., L.L. Larson, M. Wenger, and J. Carlon. 1985. Kenai River chinook and coho salmon studies. Alaska Department of Fish and Game, Federal Aid in Fish Restoration, Annual Performance Report, 1984-1985. Project F-9-17 24 (G-II-L). (In press).
- Jones, R. 1976. The use of marking data in fish population analysis. FAO Fisheries Technical Paper No. 153. 42 pp.
- Jones, R. 1977. Tagging: Theoretical methods and practical difficulties. In Gulland, J.A., editor. Fish population dynamics. John Wiley and Sons Publ. New York, New York.
- Killick, S.R. 1955. The chronological order of Fraser River sockeye salmon during migration, spawning, and death. International Pacific Salmon Fisheries Commission Bulletin No. 7. 95 pp.
- King, B.E. 1984. Site characteristics for Bendix side scan sonar deployment in Upper Cook Inlet, Alaska. Pages 187-196. In Symons, P.E.K., and M. Waldichuk, editors. Proceedings of the workshop on stream indexing for salmon escapement estimation, West Vancouver, B.C., 2-3 February 1984. Canadian Technical Report of Fisheries and Aquatic Sciences No. 1326.
- King, B.E. 1985. Bendix Corporation 1984 model side-scanning sonar counter experiments in the Susitna River, 1984. (In press).
- King, B.E. and K.E. Tarbox. 1983. Upper Cook Inlet (*Oncorhynchus* spp.) escapement studies, 1982. Alaska Department of Fish and Game, Technical Data Report No. 93. 139 pp.
- King, B.E. and K.E. Tarbox. 1984. Upper Cook Inlet (*Oncorhynchus* spp.) escapement studies, 1983. Alaska Department of Fish and Game, Technical Data Report No. 122. 152 pp.

LITERATURE CITED (Continued)

- Lister, D.B., L.M. Thorson, and I. Wallace. 1981. Chinook and coho salmon escapements and coded-wire tag returns to the Cowichan-Kiksilah River system 1976-1979. Canadian Manuscript. Report of Fisheries and Aquatic Sciences No. 1608. 78 pp.
- Marcuson, P. 1985. Personal communication. Cook Inlet Aquaculture, Soldotna, Alaska, U.S.A.
- Marcuson, P. 1984. Big River Lakes pre-enhancement investigation, 1983 field season. Cook Inlet Aquaculture Association Technical Report. 27 pp.
- Namtvedt, T.B., N.V. Friese, and D.L. Waltemyer. 1979. Cook Inlet sockeye salmon studies. Alaska Department of Fish and Game, Technical Report for period July 1, 1977 to June 30, 1978. 94 pp.
- Neilson, J.D. and G.H. Geen. 1981. Enumeration of spawning salmon from spawner residence time and aerial counts. Transactions of the American Fisheries Society (110:554-556).
- Nelson, D.C. 1985. Russian River sockeye salmon study. Alaska Department of Fish and Game, Anadromous Fish Studies, Annual Report of Progress, 1984-1985. Project F-9-17 26 (G-II-C). 60 pp.
- Ricker, W.E. 1958. Handbook of computations for biological statistics of fish populations. Bulletin Fisheries Research Board of Canada No. 119. 300 pp.
- Roberson, K., M.F. Merritt, and P.J. Fridgen. 1982. Copper River-Prince William Sound sockeye salmon catalog and inventory. Alaska Department of Fish and Game, Completion Report, July 1, 1977 to June 30, 1981. 48 pp.
- Ruesch, P.H. 1985. Annual management report, 1983, Upper Cook Inlet, Region II. Alaska Department of Fish and Game, Division of Commercial Fisheries. (In press).
- Simpson, K. 1984. The accuracy of mark-recapture estimates of escapements. Pages 209-225. In Symons, P.E.K. and M. Waldichuk, editors. Proceedings of the workshop on stream indexing for salmon escapement estimation, West Vancouver, B.C., 2-3 February 1984. Canadian Technical Report of Fisheries and Aquatic Sciences No. 1326.
- Tarbox, K.E., B.E. King, and D. Waltemyer. 1981. Kenai, Kasilof, and Crescent River sonar investigations. Alaska Department of Fish and Game Legislative Report. 37 pp.
- Tarbox, K.E., B.E. King, and D.L. Waltemyer. 1983. Cook Inlet sockeye salmon studies. Alaska Department of Fish and Game. Completion Report, July 1, 1977 to June 30, 1982. 149 pp.

LITERATURE CITED (Continued)

- Verhoeven, L.A. and E.B. Davidoff. 1962. Marine tagging of Fraser River sockeye salmon. International Pacific Salmon Fisheries Commission Bulletin No. 13. 132 pp.
- Waite, D. Personal communication. 1985. Alaska Department of Fish and Game, F.R.E.D. Division. Soldotna, Alaska, U.S.A.
- Waltemyer, D.L., T.B. Namtvedt, and B.E. King. 1980. Cook Inlet sockeye salmon studies. Alaska Department of Fish and Game, Technical Report, July 1, 1978 to June 30, 1979. 58 pp.

APPENDICES

Appendix Table 1. Total number of fish targets and estimated species composition recorded by side scan sonar in the Kenai River, 22 June through 8 August 1984*.

Date	Fish Targets	Cum	Number of Fish							
			Sockeye	Cum	Pink	Cum	Coho	Cum	Chinook	Cum
6/22	1,136	1,136	979	979	47	47	4	4	106	106
6/23	1,493	2,629	1,298	2,277	61	108	5	9	129	235
6/24	1,152	3,781	1,004	3,281	46	154	4	13	98	333
6/25	777	4,558	701	3,982	30	184	3	16	43	376
6/26	691	5,249	610	4,592	27	211	2	18	52	428
6/27	828	6,077	742	5,334	31	242	3	21	52	480
6/28	723	6,800	656	5,990	27	269	4	25	36	516
6/29	385	7,185	326	6,316	16	285	1	26	42	558
6/30	935	8,120	863	7,179	34	319	5	31	33	591
7/ 1	712	8,832	634	7,813	28	347	3	34	47	638
7/ 2	485	9,317	448	8,261	18	365	2	36	17	655
7/ 3	469	9,786	420	8,681	19	384	2	38	28	683
7/ 4	607	10,393	550	9,231	23	407	3	41	31	714
7/ 5	711	11,104	649	9,880	27	434	3	44	32	746
7/ 6	718	11,822	655	10,535	26	460	3	47	34	780
7/ 7	651	12,473	614	11,149	24	484	4	51	9	789
7/ 8	1,314	13,787	1,243	12,392	46	530	9	60	16	805
7/ 9	2,833	16,620	2,676	15,068	103	633	17	77	37	842
7/10	3,932	20,552	3,711	18,779	143	776	25	102	53	895
7/11	2,961	23,513	2,804	21,583	105	881	19	121	33	928
7/12	1,734	25,247	1,640	23,223	62	943	11	132	21	949
7/13	1,461	26,708	1,382	24,605	53	996	9	141	17	966
7/14	721	27,429	680	25,285	26	1,022	4	145	11	977
7/15	973	28,402	920	26,205	35	1,057	6	151	12	989
7/16	12,860	41,262	12,224	38,429	444	1,501	86	237	106	1,095
7/17	22,282	63,544	21,163	59,592	773	2,274	149	386	197	1,292

-Continued-

Appendix Table 1. Total number of fish targets and estimated species composition recorded by side scan sonar in the Kenai River, 22 June through 8 August 1984* (Continued).

Date	Fish Targets	Number of Fish								
		Cum	Sockeye	Cum	Pink	Cum	Coho	Cum	Chinook	Cum
7/18	47,154	110,698	46,225	105,817	370	2,644	200	586	359	1,651
7/19	19,735	130,433	19,100	124,917	317	2,961	92	678	226	1,877
7/20	15,442	145,875	14,885	139,802	351	3,312	33	711	173	2,050
7/21	20,693	166,568	20,228	160,030	420	3,732	45	756	0	2,050
7/22	31,747	198,315	31,224	191,254	470	4,202	53	809	0	2,050
7/23	34,169	232,484	33,478	224,732	598	4,800	93	902	0	2,050
7/24	23,799	256,283	23,482	248,214	136	4,936	136	1,038	45	2,095
7/25	21,306	277,589	20,925	269,139	146	5,082	194	1,232	41	2,136
7/26	18,016	295,605	18,006	287,145	10	5,092	0	1,232	0	2,136
7/27	12,211	307,816	11,724	298,869	238	5,330	249	1,481	0	2,136
7/28	10,786	318,602	10,360	309,229	202	5,532	224	1,705	0	2,136
7/29	5,802	324,404	5,375	314,604	301	5,833	126	1,831	0	2,136
7/30	3,163	327,567	2,799	317,403	279	6,112	85	1,916	0	2,136
7/31	2,617	330,184	2,336	319,739	217	6,329	64	1,980	0	2,136
8/ 1	2,042	332,226	1,634	321,373	318	6,647	64	2,044	26	2,162
8/ 2	1,935	334,161	1,575	322,948	276	6,923	63	2,107	21	2,183
8/ 3	2,555	336,716	2,072	325,020	372	7,295	82	2,189	29	2,212
8/ 4	2,032	338,748	1,610	326,630	332	7,627	62	2,251	28	2,240
8/ 5	4,523	343,271	2,736	329,366	1,553	9,180	234	2,485	0	2,240
8/ 6	2,680	345,951	1,587	330,953	956	10,136	137	2,622	0	2,240
8/ 7	2,106	348,057	894	331,847	1,094	11,230	118	2,740	0	2,240
8/ 8	4,644	352,701	2,067	333,914	2,311	13,541	266	3,006	0	2,240
Total		352701		333,914		13,541		3,006		2,240
**			10,657	344,571						

* Sonar counts apportioned by fishwheel catch. Round-off error estimated (worst case) +/- 1 fish per day.

** Sockeye salmon total includes 10,657 fish estimated to have entered the river after 8/8.

Appendix Table 2. Kenai River south bank side-scan sonar counts by sector, 22 June through 8 August 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
6 22	2	8	3	2	0	0	17	21	46	99	74	378	650	650
6 23	28	26	9	1	1	0	10	13	52	108	93	441	782	1432
6 24	17	32	15	0	0	0	13	11	38	125	146	197	594	2026
6 25	15	49	9	0	0	0	2	2	17	49	46	55	244	2270
6 26	26	21	5	0	0	0	1	2	25	59	77	92	308	2578
6 27	29	10	1	0	0	0	0	7	16	42	66	128	299	2877
6 28	12	8	5	0	0	0	1	2	8	42	58	73	209	3086
6 29	15	15	6	1	0	0	1	8	13	64	56	79	258	3344
6 30	29	9	8	0	0	0	2	1	11	26	48	39	173	3517
7 1	25	15	5	0	0	0	0	4	10	73	58	95	285	3802
7 2	9	5	5	0	0	0	0	2	4	9	26	26	86	3888
7 3	8	2	0	0	0	0	1	0	10	44	48	50	163	4051
7 4	8	8	0	0	0	0	0	0	3	16	60	81	176	4227
7 5	4	1	0	1	0	0	1	2	6	16	70	78	179	4406
7 6	8	16	15	0	0	0	4	5	9	55	42	56	210	4616
7 7	7	15	1	0	0	0	14	19	21	55	70	93	295	4911
7 8	34	67	42	3	1	1	5	6	30	84	100	90	463	5374
7 9	286	522	137	1	0	0	2	5	9	44	47	57	1110	6484
7 10	445	421	211	6	0	0	3	13	54	195	177	157	1682	8166
7 11	111	177	117	9	0	0	6	6	57	88	111	139	821	8987
7 12	52	82	90	12	0	0	3	19	37	86	77	93	551	9538
7 13	47	93	72	9	0	0	3	7	26	46	78	66	447	9985
7 14	33	33	22	3	0	0	3	2	54	74	71	54	349	10334
7 15	24	51	13	3	1	1	2	4	17	33	59	116	324	10658
7 16	42	125	232	54	2	0	4	9	58	127	182	349	1184	11842

-Continued-

Appendix Table 2. Kenai River south bank side-scan sonar counts by sector, 22 June through 8 August 1984
(continued).

DATE	SECTOR												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 17	58	539	906	259	3	0	10	19	193	174	326	422	2909	14751
7 18	66	1479	5398	1714	21	1	15	52	84	208	151	234	9423	24174
7 19	73	1279	5570	721	9	0	7	13	50	70	82	193	8067	32241
7 20	242	1289	2896	810	70	1	21	24	96	89	116	281	5935	38176
7 21	245	1912	3348	783	20	2	7	25	168	293	164	384	7351	45527
7 22	95	1795	4686	739	10	0	11	37	200	234	333	481	8621	54148
7 23	304	2943	5358	660	2	0	5	46	155	165	278	457	10373	64521
7 24	384	2122	4808	701	2	1	10	32	181	164	287	409	9101	73622
7 25	289	2350	4385	485	2	0	4	22	109	101	165	311	8223	81845
7 26	593	3536	4685	611	5	0	3	27	163	207	282	450	10562	92407
7 27	326	2397	2609	299	5	0	8	18	126	159	198	356	6501	98908
7 28	322	2201	1520	144	1	0	2	29	151	151	287	494	5302	104210
7 29	48	222	584	79	1	0	4	20	120	115	183	242	1618	105828
7 30	23	400	618	70	1	0	3	19	120	112	177	255	1798	107626
7 31	39	423	469	25	0	0	0	10	52	43	99	166	1326	108952
8 1	110	497	356	10	1	0	0	10	27	61	80	134	1286	110238
8 2	63	243	231	8	1	0	0	16	37	79	139	224	1041	111279
8 3	83	218	231	9	0	0	2	29	66	169	240	372	1419	112698
8 4	73	182	160	9	0	0	3	33	48	133	235	513	1389	114087
8 5	411	546	311	14	0	0	20	44	181	332	540	911	3310	117397
8 6	376	376	234	6	0	0	22	62	86	177	283	445	2067	119464
8 7	316	294	136	5	1	0	6	14	33	88	150	366	1409	120873
8 8	920	640	157	2	0	1	14	31	31	137	264	753	2950	123823*
TOTAL	6775	29694	50679	8268	160	8	275	802	3108	5120	6999	11935	123823*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 3. Kenai River south bank side-scan sonar counts by sector, five day time periods, 22 June through 8 August 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
6 22-26	88	136	41	3	1	0	43	49	178	440	436	1163	2578	2578
6 27- 1	110	57	25	1	0	0	4	22	58	247	286	414	1224	3802
7 2- 6	37	32	20	1	0	0	6	9	32	140	246	291	814	4616
7 7-11	883	1202	508	19	1	1	30	49	171	466	505	536	4371	8987
7 12-16	198	384	429	81	3	1	15	41	192	366	467	678	2855	11842
7 17-21	684	6498	18118	4287	123	4	60	133	591	834	839	1514	33685	45527
7 22-26	1665	12746	23922	3196	21	1	33	164	808	871	1345	2108	46880	92407
7 27-31	758	5643	5800	617	8	0	17	96	569	580	944	1513	16545	108952
8 1- 5	740	1686	1289	50	2	0	25	132	359	774	1234	2154	8445	117397
8 6- 8	1612	1310	527	13	1	1	42	107	150	402	697	1564	6426	123823*
TOTAL	6775	29694	50679	8268	160	8	275	802	3108	5120	6999	11935	123823*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 4 . Kenai River north bank side-scan sonar counts by sector, 22 June through 8 August 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
6 22	117	4	1	0	0	0	4	15	53	66	99	132	491	491
6 23	179	9	2	1	0	15	15	62	44	83	98	190	698	1189
6 24	149	67	40	3	3	4	11	39	50	79	54	63	562	1751
6 25	147	39	28	4	3	4	7	20	36	78	69	100	535	2286
6 26	155	27	9	4	0	0	4	15	34	46	33	54	381	2667
6 27	109	57	14	3	1	1	10	33	75	97	75	52	527	3194
6 28	45	23	14	5	3	3	20	53	90	123	75	65	519	3713
6 29	13	1	3	1	0	0	8	18	16	21	27	23	131	3844
6 30	141	23	20	6	2	2	11	37	46	133	182	155	758	4602
7 1	62	15	13	1	0	0	6	21	33	59	85	135	430	5032
7 2	40	11	6	0	0	0	5	32	35	77	67	124	397	5429
7 3	63	11	3	0	0	0	1	13	15	44	72	84	306	5735
7 4	55	6	2	0	0	0	2	8	27	62	61	208	431	6166
7 5	45	11	9	1	0	0	9	24	50	104	111	163	527	6693
7 6	64	60	29	5	0	1	3	28	97	111	69	65	532	7225
7 7	50	31	18	0	0	0	1	8	50	65	66	67	356	7581
7 8	153	415	80	11	0	0	2	16	40	52	47	33	849	8430
7 9	236	969	259	16	1	1	10	25	35	63	50	58	1723	10153
7 10	338	1212	333	16	0	1	12	22	41	82	75	113	2245	12398
7 11	689	922	154	3	0	0	5	11	27	88	136	118	2153	14551
7 12	310	498	99	3	0	0	6	16	29	73	70	75	1179	15730
7 13	364	385	22	1	0	0	3	14	18	70	71	73	1021	16751
7 14	124	84	14	2	0	0	0	7	27	44	33	45	380	17131
7 15	87	204	59	4	0	0	8	44	33	83	57	82	661	17792
7 16	3235	7249	467	36	7	5	41	74	77	158	178	153	11680	29472

-Continued-

Appendix Table 4 . Kenai River north bank side-scan sonar counts by sector, 22 June through 8 August 1984
(continued).

DATE	SECTOR												CUMALATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 17	2753	14359	1342	211	147	141	66	63	53	82	85	78	19380	48852
7 18	1682	32953	1621	28	8	4	112	185	207	220	343	377	37740	86592
7 19	256	5474	692	61	18	9	109	218	281	614	655	1540	9927	96519
7 20	102	184	117	47	22	12	68	258	375	909	1351	1620	5065	101584
7 21	318	881	2299	1517	785	349	262	226	360	529	1628	4188	13342	114926
7 22	267	3215	2860	1845	4640	1295	662	541	475	768	1130	2768	20466	135392
7 23	300	5079	2118	1258	5193	1507	1117	627	396	705	1367	2408	22075	157467
7 24	177	666	931	1049	2740	593	638	656	679	819	1304	2656	12908	170375
7 25	218	1292	1459	743	1754	825	938	561	273	459	916	2075	11513	181888
7 26	157	611	602	261	115	98	237	379	425	657	680	1613	5835	187723
7 27	244	2290	348	106	18	27	80	243	242	249	313	733	4893	192616
7 28	141	659	516	168	42	20	120	352	358	297	365	1071	4109	196725
7 29	98	974	617	74	18	4	68	302	285	238	380	711	3769	200494
7 30	74	229	179	32	10	4	8	59	69	101	194	413	1372	201866
7 31	55	113	87	18	6	5	6	41	108	108	236	483	1266	203132
8 1	68	36	33	10	0	0	0	28	47	77	169	288	756	203888
8 2	89	18	15	6	0	1	6	27	34	65	242	391	894	204782
8 3	151	55	13	3	0	0	5	30	48	91	208	534	1138	205920
8 4	113	45	21	8	1	2	4	14	31	80	128	196	643	206563
8 5	281	223	94	17	4	5	16	49	86	158	83	197	1213	207776
8 6	147	183	53	19	1	2	2	27	33	72	22	52	613	208389
8 7	229	274	56	8	2	2	0	8	13	48	25	32	697	209086
8 8	742	585	66	10	0	1	3	13	27	93	66	90	1696	210782*
TOTAL	15632	82731	17837	7625	15544	4943	4731	5562	5983	9400	13850	26944	210782*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 5. Kenai River north bank side-scan sonar counts by sector, five day time periods, 22 June through 8 August 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
6 22-26	747	146	80	12	6	23	41	151	217	352	353	539	2667	2667
6 27- 1	370	119	64	16	6	6	55	162	260	433	444	430	2365	5032
7 2- 6	267	99	49	6	0	1	20	105	224	398	380	644	2193	7225
7 7-11	1466	3549	844	46	1	2	30	82	193	350	374	389	7326	14551
7 12-16	4120	8420	661	46	7	5	58	155	184	428	409	428	14921	29472
7 17-21	5111	53851	6071	1864	980	515	617	950	1276	2354	4062	7803	85454	114926
7 22-26	1119	10863	7970	5156	14442	4318	3592	2764	2248	3408	5397	11520	72797	187723
7 27-31	612	4265	1747	398	94	60	282	997	1062	993	1488	3411	15409	203132
8 1- 5	702	377	176	44	5	8	31	148	246	471	830	1606	4644	207776
8 6- 8	1118	1042	175	37	3	5	5	48	73	213	113	174	3006	210782*
TOTAL	15632	82731	17837	7625	15544	4943	4731	5562	5983	9400	13850	26944	210782*	

*Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 6. Fish target observations inside and outside of the 18 m counting range of the Bendix side-scanning sonar in the Kenai River, 19 July through 30 July 1984.

Date	Time		Total	Total Fish Targets	
	Start	End		0-18 m	18-24 m
7/19	1700	1710	10	31	30
	2100	2110	10	50	22
	2122	2132	10	24	26
	2307	2312	5	21	11
	0122	0132	10	14	2
	0305	0315	10	34	7
	0716	0726	10	15	11
7/20	0100	0110	10	14	2
	0300	0310	10	34	7
	0700	0710	10	15	11
	1000	1010	10	10	10
	1200	1210	10	26	9
	1600	1610	10	23	32
	1800	1810	10	31	36
	1900	1910	10	46	32
	2200	2210	10	18	29
	2300	2310	10	32	32
7/21	0000	0010	10	34	25
	0200	0210	10	23	3
	0400	0410	10	24	6
	0600	0610	10	21	18
	0800	0810	10	54	10
	1000	1010	10	15	9
	1200	1210	10	25	19
	1400	1410	10	17	32
	1600	1610	10	35	13
	1800	1805	5	79	21
	2000	2005	5	84	12
	2200	2205	5	77	46
7/22	0000	0010	10	59	27
	0200	0205	5	20	3
	0400	0410	10	17	1
	0600	0610	10	65	20
	0800	0810	10	102	7
	1000	1010	10	7	2
	1200	1210	10	54	15
	1400	1410	10	129	20
	1600	1605	5	75	5
	1800	1805	5	63	6
	2000	2005	5	136	14
	2200	2205	5	105	0

-Continued-

Appendix Table 6. Fish target observations inside and outside of the 18 m counting range of the Bendix side-scanning sonar in the Kenai River, 19 July through 30 July 1984 (continued).

Date	Time		Total	Total Fish Targets	
	Start	End		0-18 m	18-24 m
7/23	0000	0005	5	82	1
	0500	0505	5	30	0
	0600	0605	5	52	2
	1000	1005	5	21	2
	1700	1705	5	67	15
	1900	1905	5	121	15
	2200	2205	5	107	7
7/24	0000	0005	5	23	2
	0415	0420	5	33	1
	0600	0610	10	36	5
	0800	0810	10	68	23
	1000	1010	10	41	6
	1300	1305	5	28	5
	1700	1705	5	74	5
	2000	2005	5	57	9
2300	2305	5	13	2	
7/25	0300	0310	10	22	2
	1000	1005	5	14	2
	1500	1505	5	60	4
	1800	1805	5	32	3
	2300	2305	5	16	3
7/26	0400	0405	5	6	0
	0600	0605	5	4	1
	1100	1105	5	13	5
	1400	1405	5	9	2
	1800	1805	5	20	2
	2200	2210	10	40	18
7/27	0200	0205	5	42	0
	0330	0335	5	43	1
	1000	1005	5	6	1
	1300	1305	5	14	7
	1900	1905	5	8	11
	2300	2305	5	30	12
7/28	0700	0705	5	9	6
	1200	1205	5	6	4
	1700	1705	5	11	8
	2400	2405	5	31	1

-Continued-

Appendix Table 6. Fish target observations inside and outside of the 18 m counting range of the Bendix side-scanning sonar in the Kenai River, 19 July through 30 July 1984 (continued).

Date	Time		Total	Total Fish Targets	
	Start	End		0-18 m	18-24 m
7/29	0100	0105	5	31	1
	0700	0705	5	1	0
	1000	1005	5	12	5
	1400	1405	5	6	1
	1800	1805	5	11	2
7/30	0000	0005	5	11	2

Appendix Table 7. Kenai River north bank side-scan sonar counts by hour, 22 June through 8 August 1984.

DATE	HOUR																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
6 22	37	34	37	14	30	49	42	20	15	7	13	5	5	13	7	33	6	6	17	15	8	27	30	21
6 23	37	29	27	18	45	27	19	19	19	15	47	41	31	10	3	16	5	15	25	29	45	56	61	59
6 24	44	17	23	42	30	22	13	10	26	16	8	6	16	28	30	32	17	18	23	45	37	26	15	18
6 25	30	22	20	25	18	14	15	16	18	28	24	35	32	19	29	17	14	26	19	52	24	11	12	15
6 26	14	20	24	12	7	15	26	16	13	16	10	31	16	14	21	12	11	9	31	10	6	15	15	17
6 27	17	26	15	25	26	21	9	31	26	27	57	19	28	26	29	33	19	7	18	17	12	15	10	14
6 28	33	36	24	15	18	17	25	27	18	15	14	17	24	15	11	19	25	42	13	23	16	24	24	24
6 29	6	6	6	6	6	6	3	6	6	4	2	7	3	4	5	4	3	2	8	4	2	14	10	8
6 30	25	40	54	44	40	33	31	37	31	46	30	30	52	31	37	26	23	25	22	18	31	18	17	17
7 1	11	19	26	20	18	18	14	22	12	28	22	15	30	14	21	25	15	16	9	21	12	12	21	9
7 2	12	7	7	9	4	19	17	28	13	37	16	21	8	12	34	19	20	26	31	13	7	24	6	7
7 3	8	7	21	7	4	17	18	7	9	31	10	20	14	26	10	9	10	19	12	4	16	11	11	5
7 4	6	8	11	16	41	33	23	16	1	3	18	18	21	3	3	4	37	16	21	32	22	24	37	17
7 5	33	14	31	24	23	74	41	21	15	30	18	16	24	15	16	12	14	6	21	14	17	21	16	11
7 6	6	21	53	54	27	13	20	26	21	13	9	12	20	29	22	17	12	14	25	20	17	32	14	35
7 7	28	22	20	8	10	24	25	12	15	21	15	14	13	7	11	11	2	10	10	9	12	14	15	28
7 8	93	132	145	113	24	10	14	5	13	10	3	22	10	11	10	18	22	18	10	16	32	25	39	54
7 9	51	124	52	58	33	12	15	6	9	4	21	35	29	22	23	28	37	52	118	117	140	183	268	286
7 10	164	97	69	22	28	90	96	26	77	55	71	261	182	121	59	102	41	98	62	50	34	85	82	273
7 11	390	260	100	221	77	68	72	98	37	82	109	132	121	18	22	18	34	19	38	40	19	43	49	86
7 12	184	115	112	109	43	18	18	12	30	18	36	69	69	56	23	21	11	14	30	13	14	18	30	116
7 13	191	219	271	103	18	3	6	4	6	9	23	12	26	26	11	11	12	12	19	17	6	1	6	9
7 14	39	32	60	33	13	17	24	9	4	36	9	7	8	7	8	7	5	9	3	11	13	6	11	9
7 15	35	91	85	11	13	5	15	16	12	8	7	13	7	15	18	7	3	4	17	10	39	49	39	142
7 16	529	948	974	440	129	33	96	106	252	202	82	160	364	2006	2138	874	456	123	93	38	103	334	459	741
7 17	941	1047	600	706	451	287	265	901	825	569	250	810	789	554	1456	2151	1432	978	372	747	521	695	960	1073
7 18	936	817	794	1052	809	786	704	1603	1537	2117	3210	4227	3151	2514	940	709	1348	2426	1565	2386	1045	744	802	1518
7 19	1912	1572	1161	1060	32	26	82	134	163	112	149	313	222	125	92	138	276	458	539	711	366	152	88	44
7 20	141	110	105	36	35	69	135	302	115	166	232	176	255	471	221	68	273	446	468	324	375	246	136	160
7 21	216	190	124	234	268	553	468	611	412	448	247	558	107	146	84	86	91	266	1232	1668	1932	1458	659	1284
7 22	1252	1019	269	523	180	217	315	704	709	288	430	832	544	1153	829	1291	907	1045	884	1387	1443	2026	717	1502
7 23	999	1751	1546	1150	256	421	450	697	438	394	324	469	475	834	715	1268	1215	1020	1233	1434	1137	1564	1177	1108
7 24	648	530	309	314	258	314	384	442	673	710	335	321	506	431	390	558	695	705	733	1058	791	710	743	330
7 25	194	426	417	232	156	145	260	203	305	304	228	335	223	342	580	636	664	716	468	1345	1157	1146	805	226
7 26	385	332	230	177	70	59	73	92	229	93	96	75	126	125	247	544	367	399	313	557	360	466	304	116
7 27	419	1168	809	387	128	60	174	169	95	42	58	58	61	106	82	65	39	80	129	82	137	122	188	235
7 28	368	338	109	71	32	76	101	83	64	75	43	30	82	66	121	102	64	117	134	178	253	450	299	852
7 29	1049	590	165	53	14	65	66	86	158	96	64	155	75	117	56	101	81	108	113	124	98	136	112	87
7 30	111	165	183	82	31	80	49	36	38	38	64	22	32	32	36	26	39	42	40	60	43	50	45	28
7 31	81	92	85	42	32	53	57	56	47	51	23	37	26	57	39	39	49	65	58	74	35	83	43	42
8 1	41	30	38	31	27	22	29	4	24	28	16	15	37	16	41	21	28	49	48	34	28	45	70	34
8 2	20	23	32	11	14	39	69	38	39	61	32	34	48	41	25	17	15	36	31	32	26	64	82	65
8 3	47	26	39	25	10	39	43	24	52	55	48	27	40	60	43	62	67	45	43	51	38	63	110	81
8 4	28	33	44	20	66	47	48	33	41	13	43	26	3	5	5	4	11	3	11	31	36	15	16	61
8 5	129	129	142	78	27	21	36	21	43	25	31	25	35	9	21	28	25	70	30	44	70	64	58	52
8 6	56	58	71	38	36	13	26	35	24	23	17	14	22	13	16	12	11	5	3	5	10	17	36	52
8 7	44	44	59	28	30	16	10	18	13	12	10	8	3	2	10	8	2	4	6	7	11	26	142	184
8 8	121	230	193	116	40	30	22	41	37	24	11	12	19	11	11	12	37	20	25	90	99	42	172	281

Appendix Table 8. Kenai River north bank side-scan sonar counts by hour, five day time periods, 22 June through 8 August 1984.

DATE	HOUR												CUMULATIVE	
	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	TOTAL	TOTAL
6 22-26	284	242	257	196	173	220	184	200	127	266	255	263	2667	2667
6 27- 1	219	235	203	205	213	213	227	210	177	153	156	154	2365	5032
7 2- 6	122	233	255	217	173	158	172	146	174	193	191	159	2193	7225
7 7-11	1361	808	376	369	323	683	534	302	333	470	587	1180	7326	14551
7 12-16	2383	2198	292	306	577	418	2584	3118	649	251	583	1562	14921	29472
7 17-21	7882	5872	3316	5205	6464	10172	8334	5945	7994	10012	7534	6724	85454	114926
7 22-26	7536	5167	2076	3620	4143	3445	4779	7058	7733	9412	10800	7028	72797	187723
7 27-31	4382	1986	571	877	704	554	654	667	684	992	1407	1931	15409	203132
8 1- 5	506	460	312	345	381	297	294	267	349	355	449	629	4644	207776
8 6- 8	553	505	165	152	133	72	70	69	79	136	205	867	3006	210782*
TOTAL	25228	17706	7823	11492	13284	16232	17832	17982	18299	22240	22167	20497	210782*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 9. Kenai River south bank side-scan sonar counts by hour, 22 June through 8 August 1984.

DATE	HOUR																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
6 22	34	32	19	14	23	23	20	4	17	10	7	8	24	22	31	31	18	28	45	35	58	19	67	61
6 23	35	34	27	18	38	20	26	29	14	7	20	30	40	42	52	23	50	48	38	27	41	50	37	36
6 24	27	18	32	20	24	19	30	34	25	19	11	6	10	13	30	17	35	51	39	22	56	25	18	13
6 25	11	7	7	2	3	8	8	11	16	8	5	6	17	17	12	25	7	6	11	14	5	13	19	6
6 26	3	9	11	3	4	7	11	6	6	6	14	15	13	32	24	29	9	42	16	11	10	7	13	7
6 27	5	9	10	7	8	4	14	8	5	21	9	5	14	33	14	20	25	14	20	20	13	6	8	7
6 28	6	8	0	2	0	1	1	8	5	17	34	5	11	5	7	6	8	16	13	10	6	10	7	23
6 29	15	5	13	8	4	9	12	2	8	22	1	5	12	22	14	19	16	15	13	17	6	8	7	5
6 30	5	10	6	6	0	4	9	8	1	0	7	7	3	7	8	5	15	23	8	10	20	3	5	3
7 1	7	9	4	4	3	6	10	7	4	1	16	31	10	23	23	6	11	46	17	24	5	6	7	5
7 2	2	3	8	3	3	0	5	1	4	1	1	5	6	13	6	6	5	1	2	4	5	0	0	2
7 3	3	0	6	3	2	0	0	2	5	14	10	19	2	1	1	5	14	4	18	26	12	10	6	0
7 4	3	6	6	6	0	3	3	3	4	1	14	15	34	7	5	3	14	25	7	5	3	6	2	1
7 5	0	7	4	5	2	6	2	0	0	0	3	5	7	14	17	14	11	4	14	12	30	1	14	7
7 6	9	15	15	5	1	4	10	7	11	3	8	6	8	8	4	12	12	12	10	15	13	10	6	6
7 7	12	12	12	12	12	12	12	4	6	2	0	0	5	4	3	16	8	17	15	31	18	33	26	23
7 8	11	12	12	5	8	2	11	9	6	22	18	15	42	13	20	20	25	46	20	29	18	29	25	45
7 9	25	8	17	21	14	6	18	4	10	10	12	23	34	16	17	8	30	54	67	80	101	177	200	158
7 10	142	116	77	20	16	11	29	35	44	49	38	38	78	50	30	34	47	68	90	92	92	175	155	156
7 11	88	45	30	14	11	37	33	13	25	54	37	46	25	29	24	40	27	22	19	17	46	37	32	70
7 12	47	17	11	8	8	18	24	13	16	16	48	35	33	23	29	23	18	7	21	18	19	15	25	59
7 13	62	31	32	8	7	13	8	9	16	22	19	24	22	24	20	18	17	11	14	13	11	16	13	17
7 14	17	21	26	17	11	10	10	14	13	21	7	12	13	7	18	10	22	10	10	11	14	25	19	11
7 15	20	39	14	16	15	3	0	7	0	3	2	11	15	6	11	9	4	18	31	14	23	20	29	14
7 16	30	38	33	20	12	12	17	22	37	73	59	74	60	79	146	89	58	46	21	39	53	42	56	68
7 17	244	76	126	68	9	11	15	54	66	16	99	87	109	59	112	226	232	143	73	153	379	218	194	140
7 18	93	125	103	166	150	86	74	70	61	107	139	119	124	129	275	598	804	1630	1637	814	929	647	382	161
7 19	463	527	346	88	32	5	52	40	55	65	44	12	137	462	197	602	921	351	221	646	897	678	558	668
7 20	898	429	194	189	128	68	90	82	88	76	81	225	264	178	206	453	190	387	213	191	236	331	342	395
7 21	1213	997	454	317	140	163	47	94	81	79	57	60	58	56	51	111	137	164	146	237	362	407	694	1226
7 22	1053	545	782	439	105	167	191	75	158	105	131	118	88	93	200	158	137	140	274	511	714	827	464	1146
7 23	1804	781	723	344	107	238	136	138	191	132	95	95	106	280	166	426	172	170	209	251	671	1146	863	1129
7 24	1088	733	382	374	193	124	178	104	206	307	109	189	110	318	236	186	77	154	316	288	410	695	975	1349
7 25	1413	587	570	263	195	57	44	57	37	39	21	31	83	53	57	74	52	61	172	204	953	557	1003	1640
7 26	1889	735	1037	684	189	221	260	389	251	128	197	302	253	273	190	167	151	196	93	234	493	469	821	940
7 27	1625	1397	552	181	88	113	108	87	42	40	29	22	31	64	87	92	105	58	90	86	165	290	394	755
7 28	1770	874	451	343	124	35	80	112	26	23	25	38	32	73	118	120	112	71	90	124	173	135	172	181
7 29	152	174	117	59	32	47	44	29	38	30	33	22	32	24	44	47	56	52	82	98	65	73	121	147
7 30	290	278	162	116	22	23	39	26	21	27	32	23	12	49	32	41	37	39	58	114	57	67	68	165
7 31	427	204	72	101	32	12	16	25	14	8	15	9	8	16	18	11	32	27	23	34	52	45	42	83
8 1	213	228	220	166	76	22	6	6	2	5	5	11	13	7	16	16	36	54	31	24	25	43	20	41
8 2	50	74	142	113	62	15	7	12	25	2	5	18	20	22	37	40	45	57	37	57	45	37	32	87
8 3	154	60	149	47	40	15	35	23	27	16	25	47	28	65	99	88	75	58	75	30	78	56	48	81
8 4	94	113	84	51	36	11	24	23	16	27	34	46	32	58	63	75	61	56	67	70	84	80	73	111
8 5	271	250	195	130	49	70	58	46	104	98	127	158	123	75	117	125	101	91	116	151	162	269	247	177
8 6	155	91	90	70	58	33	88	124	136	76	49	72	54	76	71	90	59	65	49	70	40	126	210	115
8 7	45	65	83	27	25	34	68	85	79	49	55	20	48	23	61	78	34	53	44	58	57	53	82	183
8 8	128	136	110	150	34	40	46	57	85	71	51	44	78	104	95	84	98	84	82	65	142	382	542	242

Appendix Table 10. Kenai River south bank side-scan sonar counts by hour, five day time periods, 22 June through 8 August 1984.

DATE	HOUR												CUMULATIVE	
	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	TOTAL	TOTAL
6 22-26	210	153	169	179	128	122	230	274	294	258	284	277	2578	2578
6 27- 1	79	60	39	79	84	120	140	122	189	152	83	77	1224	3802
7 2- 6	48	61	21	33	43	86	100	73	102	113	90	44	814	4616
7 7-11	471	220	129	168	228	227	296	212	344	460	726	890	4371	8987
7 12-16	322	185	109	124	217	291	282	373	211	192	238	311	2855	11842
7 17-21	5065	2051	792	618	694	924	1576	2831	4959	4331	5084	4760	33685	45527
7 22-26	10628	5598	1596	1572	1554	1288	1657	1860	1310	2552	6935	10330	46880	92407
7 27-31	7191	2154	528	566	269	248	341	610	589	799	1122	2128	16545	108952
8 1- 5	1507	1297	396	240	322	476	443	676	634	658	879	917	8445	117397
8 6- 8	620	530	224	468	496	291	383	479	393	368	800	1374	6426	123823*
TOTAL	26141	12309	4003	4047	4035	4073	5448	7510	9025	9883	16241	21108	123823*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 11. Total number of fish targets and estimated species composition recorded by north bank sonar in the Kenai River, 22 June through 8 August 1984*.

Date	Fish Targets	Number of Fish								
		Cum	Sockeye	Cum	Pink	Cum	Coho	Cum	Chinook	Cum
6/22	485	485	462	462	16	16	4	4	3	3
6/23	711	1,196	677	1,139	24	40	5	9	5	8
6/24	561	1,757	534	1,673	19	59	4	13	4	12
6/25	531	2,288	506	2,179	18	77	3	16	4	16
6/26	385	2,673	367	2,546	13	90	2	18	3	19
6/27	529	3,202	504	3,050	18	108	3	21	4	23
6/28	513	3,715	489	3,539	17	125	4	25	3	26
6/29	127	3,842	121	3,660	4	129	1	26	1	27
6/30	761	4,603	725	4,385	26	155	5	31	5	32
7/ 1	433	5,036	412	4,797	15	170	3	34	3	35
7/ 2	399	5,435	380	5,177	14	184	2	36	3	38
7/ 3	305	5,740	290	5,467	11	195	2	38	2	40
7/ 4	431	6,171	410	5,877	15	210	3	41	3	43
7/ 5	532	6,703	507	6,384	18	228	3	44	4	47
7/ 6	531	7,234	506	6,890	18	246	3	47	4	51
7/ 7	354	7,588	337	7,227	12	258	3	50	2	53
7/ 8	850	8,438	810	8,037	28	286	6	56	6	59
7/ 9	1,723	10,161	1,641	9,678	59	345	11	67	12	71
7/10	2,246	12,407	2,139	11,817	76	421	16	83	15	86
7/11	2,153	14,560	2,050	13,867	74	495	14	97	15	101
7/12	1,177	15,737	1,121	14,988	40	535	8	105	8	109
7/13	1,022	16,759	973	15,961	35	570	7	112	7	116
7/14	380	17,139	362	16,323	13	583	2	114	3	119
7/15	662	17,801	630	16,953	23	606	4	118	5	124
7/16	11,676	29,477	11,120	28,073	397	1,003	80	198	79	203
7/17	19,375	48,852	18,452	46,525	659	1,662	132	330	132	335

-Continued-

Appendix Table 11. Total number of fish targets and estimated species composition recorded by north bank sonar in the Kenai River, 22 June through 8 August 1984* (continued).

Date	Fish		Number of Fish							
	Targets	Cum	Sockeye	Cum	Pink	Cum	Coho	Cum	Chinook	Cum
7/18	37,729	86,581	37,435	83,960	0	1,662	147	477	147	482
7/19	11,670	98,251	11,579	95,539	0	1,662	46	523	45	527
7/20	9,497	107,748	9,341	104,880	117	1,779	0	523	39	566
7/21	13,334	121,082	13,278	118,158	56	1,835	0	523	0	566
7/22	23,126	144,208	23,082	141,240	44	1,879	0	523	0	566
7/23	23,799	168,007	23,684	164,924	86	1,965	29	552	0	566
7/24	14,707	182,714	14,707	179,631	0	1,965	0	552	0	566
7/25	13,083	195,797	12,988	192,619	24	1,989	71	623	0	566
7/26	7,456	203,253	7,446	200,065	10	1,999	0	623	0	566
7/27	5,709	208,962	5,679	205,744	10	2,009	20	643	0	566
7/28	5,487	214,449	5,434	211,178	15	2,024	38	681	0	566
7/29	4,191	218,640	4,036	215,214	97	2,121	58	739	0	566
7/30	1,372	220,012	1,310	216,524	53	2,174	9	748	0	566
7/31	1,293	221,305	1,235	217,759	50	2,224	8	756	0	566
8/ 1	756	222,061	676	218,435	50	2,274	30	786	0	566
8/ 2	894	222,955	799	219,234	60	2,334	35	821	0	566
8/ 3	1,136	224,091	1,015	220,249	77	2,411	44	865	0	566
8/ 4	643	224,734	575	220,824	43	2,454	25	890	0	566
8/ 5	1,213	225,947	1,015	221,839	128	2,582	70	960	0	566
8/ 6	613	226,560	513	222,352	65	2,647	35	995	0	566
8/ 7	697	227,257	583	222,935	57	2,704	57	1,052	0	566
8/ 8	1,695	228,952	1,417	224,352	139	2,843	139	1,191	0	566
Total	228,952		224,352		2,843		1,191		566	

* Sonar counts apportioned by fishwheel catch. Round-off error estimated (worst case) +/- 1 fish per day.

Appendix Table 12. Total number of fish targets and estimated species composition recorded by south bank sonar in the Kenai River, 22 June through 8 August 1984*.

Date	Fish		Number of Fish							
	Targets	Cum	Sockeye	Cum	Pink	Cum	Coho	Cum	Chinook	Cum
6/22	651	651	517	517	31	31	0	0	103	103
6/23	782	1,433	621	1,138	37	68	0	0	124	227
6/24	591	2,024	470	1,608	27	95	0	0	94	321
6/25	246	2,270	195	1,803	12	107	0	0	39	360
6/26	306	2,576	243	2,046	14	121	0	0	49	409
6/27	299	2,875	238	2,284	13	134	0	0	48	457
6/28	210	3,085	167	2,451	10	144	0	0	33	490
6/29	258	3,343	205	2,656	12	156	0	0	41	531
6/30	174	3,517	138	2,794	8	164	0	0	28	559
7/ 1	279	3,796	222	3,016	13	177	0	0	44	603
7/ 2	86	3,882	68	3,084	4	181	0	0	14	617
7/ 3	164	4,046	130	3,214	8	189	0	0	26	643
7/ 4	176	4,222	140	3,354	8	197	0	0	28	671
7/ 5	179	4,401	142	3,496	9	206	0	0	28	699
7/ 6	187	4,588	149	3,645	8	214	0	0	30	729
7/ 7	297	4,885	277	3,922	12	226	1	1	7	736
7/ 8	464	5,349	433	4,355	18	244	3	4	10	746
7/ 9	1,110	6,459	1,035	5,390	44	288	6	10	25	771
7/10	1,686	8,145	1,572	6,962	67	355	9	19	38	809
7/11	808	8,953	754	7,716	31	386	5	24	18	827
7/12	557	9,510	519	8,235	22	408	3	27	13	840
7/13	439	9,949	409	8,644	18	426	2	29	10	850
7/14	341	10,290	318	8,962	13	439	2	31	8	858
7/15	311	10,601	290	9,252	12	451	2	33	7	865
7/16	1,184	11,785	1,104	10,356	47	498	6	39	27	892
7/17	2,907	14,692	2,711	13,067	114	612	17	56	65	957

-Continued-

Appendix Table 12. Total number of fish targets and estimated species composition recorded by south bank sonar in the Kenai River, 22 June through 8 August 1984* (continued).

Date	Fish		Number of Fish							
	Targets	Cum	Sockeye	Cum	Pink	Cum	Coho	Cum	Chinook	Cum
7/18	9,425	24,117	8,790	21,857	370	982	53	109	212	1,169
7/19	8,065	32,182	7,521	29,378	317	1,299	46	155	181	1,350
7/20	5,945	38,127	5,544	34,922	234	1,533	33	188	134	1,484
7/21	7,359	45,486	6,950	41,872	364	1,897	45	233	0	1,484
7/22	8,621	54,107	8,142	50,014	426	2,323	53	286	0	1,484
7/23	10,370	64,477	9,794	59,808	512	2,835	64	350	0	1,484
7/24	9,092	73,569	8,775	68,583	136	2,971	136	486	45	1,529
7/25	8,223	81,792	7,937	76,520	122	3,093	123	609	41	1,570
7/26	10,560	92,352	10,560	87,080	0	3,093	0	609	0	1,570
7/27	6,502	98,854	6,045	93,125	228	3,321	229	838	0	1,570
7/28	5,299	104,153	4,926	98,051	187	3,508	186	1,024	0	1,570
7/29	1,611	105,764	1,339	99,390	204	3,712	68	1,092	0	1,570
7/30	1,791	107,555	1,489	100,879	226	3,938	76	1,168	0	1,570
7/31	1,324	108,879	1,101	101,980	167	4,105	56	1,224	0	1,570
8/ 1	1,286	110,165	958	102,938	268	4,373	34	1,258	26	1,596
8/ 2	1,041	111,206	776	103,714	216	4,589	28	1,286	21	1,617
8/ 3	1,419	112,625	1,057	104,771	295	4,884	38	1,324	29	1,646
8/ 4	1,389	114,014	1,035	105,806	289	5,173	37	1,361	28	1,674
8/ 5	3,310	117,324	1,721	107,527	1,425	6,598	164	1,525	0	1,674
8/ 6	2,067	119,391	1,074	108,601	891	7,489	102	1,627	0	1,674
8/ 7	1,409	120,800	311	108,912	1,037	8,526	61	1,688	0	1,674
8/ 8	2,949	123,749	650	109,562	2,172	10,698	127	1,815	0	1,674
Total	123,749		109,562		10,698		1,815		1,674	

* Sonar counts apportioned by fishwheel catch. Round-off error estimated (worst case) +/- 1 fish per day.

Appendix Table 13. Summary of Kenai River sonar site tagged sockeye salmon recoveries, 1984.

Tag Number	Date Tagged	Date Recovered	Recovery Location	Recovery Method
02004	6/24	7/26	Russian R.	Weir
02024	6/26	9/13	Snow R.	Fish found dead
02036	6/27	7/03	Moose R. confluence	Hook and line
02047	6/27	7/16	Russian R.	Weir
02072	6/28	7/05	Moose R. confluence	Hook and line
02075	6/28	7/20	Quartz Cr.	Weir
02115	6/29	6/29	Sonar site	Fishwheel
02120	6/29	7/07	Big Eddy	Gill net
02150	7/01	7/05	Swiftwater	Hook and line
02155	7/02	7/04	Centennial	Hook and line
02159	7/04	1/	Kalifonsky Beach	Set gill net
02167	7/05	7/17	Hidden Cr.	Weir
02168	7/05	7/30	Russian R.	Weir
02169	7/05	8/01	Quartz Cr.	Weir
02172	7/05	7/16	Kalifonsky Beach	Set gill net
02177	7/06	7/30	Quartz Cr.	Weir
02186	7/07	8/02	Quartz Cr.	Weir
02188	7/07	7/18	Hidden Cr.	Weir
02190	7/07	7/07	Slikok Cr. confluence	Hook and line
02208	7/11	7/19	Hidden Cr.	Weir
02212	7/11	8/15	Quartz Cr.	Weir
02213	7/11	7/16	Hidden Cr.	Weir
02214	7/11	7/24	Russian R. confluence	Hook and line
02215	7/11	7/20	Hidden Cr.	Weir
02216	7/11	8/02	Railroad Cr.	Hook and line
02219	7/12	7/22	Hidden Cr.	Weir
02221	7/12	8/11	Russian R.	Weir
02232	7/13	7/22	Moose R. confluence	Hook and line
02242	7/13	7/21	Hidden Cr.	Weir
02249	7/15	7/31	Quartz Cr.	Weir
02250	7/15	7/29	Hidden Cr.	Weir
02252	7/15	7/26	Quartz Cr.	Weir
02254	7/15	7/29	Hidden Cr.	Weir
02258	7/16	7/23	Hidden Cr.	Weir
02261	7/16	7/23	Hidden Cr.	Weir
02262	7/16	8/10	Hidden Cr.	Weir
02266	7/16	8/06	Russian R.	Weir
02267	7/16	7/23	Russian R. confluence	Hook and line
02268	7/16	7/21	Hidden Cr.	Weir
02269	7/16	7/28	Russian R.	Weir
02277	7/16	7/22	Hidden Cr.	Weir
02282	7/18	7/21	Naptown	Hook and line
02284	7/17	7/26	Hidden Cr.	Weir
02288	7/17	7/28	Russian R.	Weir
02289	7/17	9/04	Ptarmigan Cr.	Fish found dead
02291	7/17	7/30	Russian R.	Weir
02292	7/17	8/02	Quartz Cr.	Weir

-Continued-

Appendix Table 13. Summary of Kenai River sonar site tagged sockeye salmon recoveries, 1984 (continued).

Tag Number	Date Tagged	Date Recovered	Recovery Location	Recovery Method
02299	7/17	7/18	College Hole	Hook and line
02300	7/17	8/02	Johnson Cr.	Fish found dead
02302	7/17	8/12	Russian R.	Weir
02307	7/17	7/29	Russian R.	Weir
02312	7/17	7/21	Funny R. confluence	Hook and line
02313	7/17	7/22	Naptown	Hook and line
02320	7/17	8/04	Quartz Cr.	Weir
02322	7/17	8/10	Quartz Cr.	Weir
02323	7/18	7/23	Hidden Cr.	Weir
02324	7/18	8/15	Skilak L.	Fish found dead
02326	7/18	7/26	Russian R.	Weir
02328	7/18	8/11	Hidden Cr.	Weir
02349	7/19	7/25	Funny R. confluence	Hook and line
03620	7/19	7/24	Eagle Rock	Hook and line
03633	7/19	7/20	Centennial	Hook and line
03636	7/19	7/23	Naptown	Hook and line
03637	7/19	1/	Russian R. confluence	Hook and line
03639	7/19	8/11	Hidden Cr.	Weir
03652	7/19	7/30	East Forelands	Set gill net
03657	7/19	7/20	Sonar site	Fishwheel
03658	7/19	7/29	Hidden Cr.	Weir
03661	7/19	8/14	Quartz Cr.	Weir
03667	7/19	7/31	Hidden Cr.	Weir
03671	7/20	7/22	Sonar site weir	Fish found dead
03681	7/20	7/21	Riverside	Hook and line
03685	7/20	7/20	College Hole	Hook and line
03689	7/20	7/22	Poacher's Cove	Hook and line
03692	7/20	7/30	Hidden Cr.	Weir
03697	7/20	7/22	Sonar site weir	Fish found dead
03720	7/20	7/22	Sonar site weir	Fish found dead
03745	7/20	7/30	Russian R.	Weir
03752	7/20	8/08	Russian R.	Weir
03758	7/20	7/22	Sonar site weir	Fish found dead
03759	7/20	8/08	Hidden Cr.	Weir
03764	7/20	7/22	Sonar site weir	Fish found dead
03765	7/20	7/23	Eagle Rock	Hook and line
03768	7/20	7/23	Russian R.	Weir
03774	7/20	8/05	Russian R.	Weir
03780	7/20	7/30	Russian R. confluence	Hook and line
03785	7/20	7/23	Swiftwater	Hook and line
03797	7/20	7/23	College Hole	Hook and line
03805	7/20	7/27	Poacher's Cove	Hook and line
03809	7/20	7/25	Poacher's Cove	Fish found dead
03833	7/20	8/07	Quartz Cr.	Weir
03838	7/20	8/13	Russian R.	Weir
03849	7/20	7/20	Centennial	Hook and line
03852	7/20	7/22	Sonar site weir	Fish found dead

-Continued-

Appendix Table 13. Summary of Kenai River sonar site tagged sockeye salmon recoveries, 1984 (continued).

Tag Number	Date Tagged	Date Recovered	Recovery Location	Recovery Method
03854	7/20	1/	Kalifonsky Beach	Set gill net
03874	7/21	8/06	Hidden Cr.	Weir
03877	7/21	7/29	Russian R. confluence	Hook and line
03879	7/21	8/06	Sonar site	Fishwheel
03880	7/21	7/29	Hidden Cr.	Weir
03883	7/21	7/28	Hidden Cr.	Weir
03891	7/21	7/25	King Rapids	Hook and line
03906	7/21	8/11	Russian R.	Weir
03912	7/21	7/22	Poacher's Cove	Hook and line
03917	7/21	7/29	Hidden Cr.	Weir
03947	7/21	7/22	Sunken Island	Hook and line
03959	7/21	7/21	Mile 9.3	Gill net
03967	7/21	7/24	Thompson's Hole	Hook and line
03980	7/21	7/22	Soldotna Bridge	Hook and line

1/ Incomplete recovery data.

Appendix Table 14. Daily fishwheel catch by species on the north bank of the Kenai River, 27 June through 8 August 1984 1/2/.

Date	Number Wheels	Hours Open	Sockeye	Pink	Chum	Coho	Chinook	Other ^{3/}
6/27	1	14	14					
6/28	1	20	12					3
6/29	1	23	16					
6/30	1	24	3					1
7/01	1	21						
7/02	1	24						
7/03	1	28	2					
7/04	1	20	8					1
7/05	1	28	3					
7/06	1	21	2	1				
7/07	1	24	4	1				
7/08	1	27					1	
7/09	1	0						
7/10	1	22	4					
7/11	1	18						
7/12	1	17	6					
7/13	1	22	6			1		
7/14	1	24	2					
7/15	1	23	3					
7/16	1	23	24	3				
7/17	1	24	31					2
7/18	1	30	78					1
7/19	1	16	431			2	2	3
7/20	1	24	240	3			1	
7/21	1	19	237	1				4
7/22	1	23	525	1				
7/23	1	23	822	3		1		3
7/24	1	23	611					1
7/25	1	26	549	1		3		
7/26	1	24	710	1				
7/27	1	22	564	1		2		
7/28	1	20	722	2		5		
7/29	1	24	208	5		3		
7/30	1	16	124	3		1		
7/31	1	19	24	3				
8/01	1	25	24	1		1		
8/02	1	21	43	3		1		3
8/03	1	26	58	4		1		
8/04	1	26	35	4		4		
8/05	1	25	119	8		1		

-Continued-

Appendix Table 14. Daily fishwheel catch by species on the north bank of the Kenai River, 27 June through 8 August 1984 1/2/ (continued).

Date	Number Wheels	Hours Open	Sockeye	Pink	Chum	Coho	Chinook	Other ^{3/}
8/06	1	17	55	14		11		1
8/07	1	26	30	5		4		
8/08	1	23	1			1		
Total			6,350	68		42	3	23

1/ Fishwheel catch adjusted for 24 hours: $\frac{\text{daily catch} \times 24 \text{ hours}}{\text{hours open}}$

2/ Actual catch: sockeye - 6,371; pink - 69; coho - 42; chinook - 3; and other - 23.

3/ Other species include Dolly Varden trout, rainbow trout, and whitefish.

Appendix Table 15. Daily fishwheel catch by species on the south bank of the Kenai River, 22 June through 8 August 1984 1/2/.

Date	Number Wheels	Hours Open	Sockeye	Pink	Chum	Coho	Chinook	Other ^{3/}
6/22	1	22						
6/23	1	25	2				2	
6/24	1	25	2					
6/25	1	9					5	
6/26	1	21	11	1			6	
6/27	1	26	27	1			3	5
6/28	1	22	14					
6/29	1	28	23				3	
6/30	1	25	11				2	
7/01	1	20	2				2	
7/02	1	24	2				1	
7/03	1	28	3					
7/04	1	20	2					
7/05	1	28	5	1				
7/06	1	22	7	4				
7/07	1	24	7					
7/08	1	27	1	1			1	
7/09	1	0						
7/10	1	0						
7/11	1	24	20	1				
7/12	1	29	8	1			1	
7/13	1	25	5				1	
7/14	1	24	1					
7/15	1	23	3					
7/16	1	22	7					1
7/17	1	24	22					
7/18	1	28	33					
7/19	1	28	21	1		1		
7/20	1	21	38	3			1	1
7/21	1	16	18	2				
7/22	1	26	39	2				
7/23	1	24	96	4		1		4
7/24	1	24	71					3
7/25	1	25	123	3		3	1	6
7/26	1	23	190					6
7/27	1	26	64	6	1	5		
7/28	1	21	121	1		2		
7/29	1	33	60	7		5		4
7/30	1	20	53	12				2
7/31	1	24	25	2		2		

-Continued-

Appendix Table 15. Daily fishwheel catch by species on the south bank of the Kenai River, 22 June through 8 August 1984 ^{1/2/} (continued).

Date	Number Wheels	Hours Open	Sockeye	Pink	Chum	Coho	Chinook	Other ^{3/}
8/01	1	26	3			1	1	
8/02	1	19	30	8		1		1
8/03	1	28	32	10		2	1	1
8/04	1	26	23	10			1	
8/05	1	25	52	47		3		
8/06	1	17	53	40		7		
8/07	1	8	15	60		6		
8/08	1	22	26	77		2		1
Total			1,371	305	1	41	32	35

1/ Fishwheel catch adjusted for 24 hours: $\frac{\text{daily catch} \times 24 \text{ hrs}}{\text{hours open}}$

2/ Actual catch: sockeye - 1,407; pink - 311; chum - 1; coho - 41; chinook - 32; and other - 35.

3/ Other species include Dolly Varden trout, rainbow trout, and whitefish.

Appendix Table 16. Length composition of the major age classes of sockeye salmon collected in the Kenai River, 1976-1984 1/.

Year	Age Class	Male			Female			Total			Ratio Male-Female
		Average Length (mm) <u>1/</u>	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	
1976	1.2	500	7.7	41	516	7.7	22	506	---	63	1.9:1
1979		493	9.7	41	528	6.6	33	508	6.4	74	1.2:1
1980		482	3.9	168	494	3.6	100	486	---	268	1.7:1
1981		493	5.6	85	513	5.6	73	502	---	158	1.2:1
1982		483	8.9	70	505	12.6	32	490	10.0	63	2.2:1
1983		524	8.7	25	520	5.5	30	522	5.0	55	0.8:1
1984		474	2.8	280	473	3.5	196	474	2.2	476	1.4:1
1976	1.3	594	12.0	16	590	3.2	25	592	---	41	0.6:1
1977		615	4.9	40	593	2.7	77	601	---	117	0.5:1
1978		---	---	287	---	---	388	597	1.3	675	0.7:1
1979		605	3.2	122	587	2.4	114	596	2.1	236	1.1:1
1980		580	2.9	180	561	2.2	192	570	---	372	0.9:1
1981		590	1.8	290	569	1.3	430	577	---	720	0.7:1
1982		596	1.9	723	572	1.3	841	583	1.6	1,564	0.9:1
1983		598	2.1	215	577	1.2	269	586	1.1	484	0.8:1
1984		582	1.6	385	559	1.4	395	571	1.0	780	1.0:1

-Continued-

Appendix Table 16. Length composition of the major age classes of sockeye salmon collected in the Kenai River, 1976-1984 ^{1/} (continued).

Year	Age Class	Male			Female			Total			Ratio Male-Female
		Average Length (mm) ^{1/}	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	
1976	2.2	543	9.6	14	533	11.1	10	539	---	24	1.4:1
1979		545	10.9	17	543	7.9	23	544	6.5	40	0.7:1
1980		525	12.8	13	534	4.2	35	532	---	48	0.4:1
1982		530	13.8	21	522	8.1	30	525	10.5	51	0.7:1
1984		505	3.6	116	508	3.0	159	507	2.3	275	0.7:1
1977	2.3	616	10.5	4	607	8.5	4	612	---	8	1.0:1
1980		589	2.7	67	579	3.2	80	584	---	147	0.8:1
1982		598	4.9	46	580	8.4	21	592	6.0	67	2.2:1
1983		595	4.2	--	582	4.2	--	587	3.0	61	0.7:1
1984		570	2.3	210	557	1.7	192	564	1.5	402	1.1:1

^{1/} Length measured mid-eye to fork of tail.

Appendix Table 17. Weight composition of the major age classes of sockeye salmon collected in the Kenai River, 1981-1984.

Year	Age Class	Male			Female			Total		
		Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size
1981	1.2	2.1	0.07	85	2.3	0.07	73	2.2	---	158
1982		1.9	0.15	47	2.0	0.20	16	1.9	0.17	63
1983		2.2	0.09	25	2.2	0.07	30	2.2	0.06	55
1984		1.9	0.07	66	1.9	0.07	54	1.9	0.05	120
1981	1.3	3.8	0.04	290	3.2	0.02	430	3.4	---	720
1982		4.0	0.06	413	3.3	0.04	444	3.7	0.05	857
1983		3.7	0.04	215	3.2	0.02	269	3.4	0.02	484
1984		3.2	0.07	96	3.0	0.05	103	3.1	0.04	199
1981	2.2	2.3	0.08	42	2.3	0.06	46	2.3	---	88
1982		2.3	0.31	14	2.2	0.22	17	2.2	0.26	31
1981	2.3	3.3	0.13	20	3.3	0.10	27	3.3	---	47
1982		3.6	0.16	26	3.3	0.26	13	3.5	0.19	39
1983		3.5	0.10	26	3.2	0.07	35	3.3	0.06	61
1984		3.2	0.10	36	2.8	0.05	62	3.0	0.05	98

Appendix Table 18. Total number of fish targets and estimated species composition recorded by side-scan sonar in the Kasilof River, 10 June through 31 July 1984*.

Date	Fish		Number of Fish							
	Targets	Cum	Sockeye	Cum	Pink	Cum	Coho	Cum	Chinook	Cum
6/10	300	300	284	284	1	1	0	0	15	15
6/11	360	660	342	626	2	3	0	0	16	31
6/12	382	1,042	359	985	2	5	0	0	21	52
6/13	296	1,338	279	1,264	1	6	0	0	16	68
6/14	342	1,680	319	1,583	2	8	0	0	21	89
6/15	485	2,165	453	2,036	2	10	0	0	30	119
6/16	695	2,860	649	2,685	3	13	0	0	43	162
6/17	442	3,302	415	3,100	2	15	0	0	25	187
6/18	458	3,760	434	3,534	2	17	0	0	22	209
6/19	769	4,529	728	4,262	3	20	0	0	38	247
6/20	1,473	6,002	1,411	5,673	7	27	0	0	55	302
6/21	1,924	7,926	1,819	7,492	8	35	0	0	97	399
6/22	2,234	10,160	2,124	9,616	10	45	0	0	100	499
6/23	2,439	12,599	2,322	11,938	11	56	0	0	106	605
6/24	2,695	15,294	2,552	14,490	11	67	0	0	132	737
6/25	1,345	16,639	1,248	15,738	4	71	0	0	93	830
6/26	1,462	18,101	1,369	17,107	5	76	0	0	88	918
6/27	2,090	20,191	1,951	19,058	21	97	0	0	118	1,036
6/28	2,590	22,781	2,423	21,481	27	124	0	0	140	1,176
6/29	2,933	25,714	2,743	24,224	30	154	0	0	160	1,336
6/30	2,748	28,462	2,630	26,854	77	231	0	0	41	1,377
7/ 1	3,278	31,740	3,135	29,989	94	325	0	0	49	1,426
7/ 2	3,281	35,021	3,151	33,140	80	405	0	0	50	1,476
7/ 3	1,740	36,761	1,666	34,806	48	453	0	0	26	1,502
7/ 4	4,907	41,668	4,786	39,592	90	543	0	0	31	1,533
7/ 5	9,327	50,995	9,077	48,669	182	725	0	0	68	1,601

-Continued-

Appendix Table 18. Total number of fish targets and estimated species composition recorded by side-scan sonar in the Kasilof River, 10 June through 31 July 1984* (continued).

Date	Fish Targets	Cum	Number of Fish							
			Sockeye	Cum	Pink	Cum	Coho	Cum	Chinook	Cum
7/ 6	6,393	57,388	6,076	54,745	305	1,030	0	0	12	1,613
7/ 7	4,940	62,328	4,581	59,326	307	1,337	0	0	52	1,665
7/ 8	9,980	72,308	9,481	68,807	477	1,814	0	0	22	1,687
7/ 9	13,188	85,496	12,505	81,312	602	2,416	0	0	81	1,768
7/10	8,019	93,515	7,820	89,132	186	2,602	0	0	13	1,781
7/11	4,777	98,292	4,525	93,657	137	2,739	0	0	115	1,896
7/12	1,183	99,475	1,120	94,777	38	2,777	0	0	25	1,921
7/13	2,676	102,151	2,562	97,339	79	2,856	0	0	35	1,956
7/14	4,409	106,560	4,214	101,553	141	2,997	0	0	54	2,010
7/15	9,540	116,100	9,103	110,656	329	3,326	0	0	108	2,118
7/16	14,164	130,264	13,602	124,258	458	3,784	0	0	104	2,222
7/17	11,453	141,717	10,976	135,234	111	3,895	24	24	342	2,564
7/18	11,159	152,876	10,667	145,901	157	4,052	0	24	335	2,899
7/19	13,592	166,468	13,037	158,938	160	4,212	0	24	395	3,294
7/20	11,226	177,694	10,800	169,738	116	4,328	0	24	310	3,604
7/21	9,522	187,216	9,082	178,820	104	4,432	54	78	282	3,886
7/22	8,100	195,316	7,372	186,192	466	4,898	84	162	178	4,064
7/23	5,685	201,001	5,022	191,214	419	5,317	63	225	181	4,245
7/24	8,373	209,374	7,408	198,622	601	5,918	95	320	269	4,514
7/25	6,297	215,671	5,585	204,207	432	6,350	74	394	206	4,720
7/26	5,626	221,297	4,979	209,186	401	6,751	65	459	181	4,901
7/27	3,251	224,548	1,931	211,117	1,257	8,008	16	475	47	4,948
7/28	3,114	227,662	1,915	213,032	1,134	9,142	16	491	49	4,997
7/29	2,781	230,443	1,640	214,672	1,088	10,230	13	504	40	5,037
7/30	2,697	233,140	1,414	216,086	1,243	11,473	10	514	30	5,067
7/31	1,583	234,723	902	216,988	653	12,126	7	521	21	5,088
Total	234,723		216,988		12,126		521		5,088	
**			14,697	231,685						

* Sonar counts apportioned by fishwheel catch. Round-off error estimated (worst case) +/- 1 fish per day.

** Sockeye salmon total includes 1,536 fish estimated to have entered the river prior to 6/10, and 13,161 fish estimated to have entered the river after 7/31.

Appendix Table 19. Summary of Kasilof sonar site tagged sockeye salmon recoveries, 1984.

Tag Number	Date Tagged	Date Recovered	Recovery Location	Recovery Method
00011	6/20	7/02	Nikolai Cr.	Stream survey
00013	6/20	8/07	Nikolai Cr.	Stream survey
00018	6/20	6/20	Crooked Cr.	Hook and line
00023	6/21	8/01	Bear Cr.	Weir
00027	6/21	6/23	Cohoe Beach	Set gill net
00031	6/21	8/22	Glacier Flat Cr.	Weir
00039	6/21	7/27	Nikolai Cr.	Stream survey
00055	6/22	7/27	Bear Cr.	Weir
00057	6/22	6/25	Cohoe Beach	Set gill net
00071	6/22	7/30	Bear Cr.	Weir
00074	6/22	7/27	Nikolai Cr.	Stream Survey
00087	6/23	6/25	Cohoe Beach	Set gill net
00093	6/23	7/31	Bear Cr.	Weir
00111	6/23	6/25	Kasilof Bay	Set gill net
00112	6/23	6/25	Kalifonsky Beach	Set gill net
00115	6/24	8/02	Bear Cr.	Weir
00121	6/24	8/11	Glacier Flat Cr.	Weir
00124	6/24	6/25	Cohoe Beach	Set gill net
00132	6/24	8/01	Bear Cr.	Weir
00138	6/24	6/26	Cohoe Beach	Set gill net
00139	6/24	7/30	Bear Cr.	Weir
00147	6/24	6/25	Cohoe Beach	Set gill net
00150	6/24	8/06	Moose Cr.	Stream survey
00159	6/24	6/26	Kasilof Bay	Set gill net
00169	6/24	7/13 or 7/16	Kalifonsky Beach	Set gill net
00176	6/25	7/30	Bear Cr.	Weir
00188	6/25	6/26	Kalifonsky Beach	Set gill net
00189	6/25	7/30	Bear Cr.	Weir
00197	6/25	7/31	Bear Cr.	Weir
00199	6/25	7/28	Bear Cr.	Weir
00210	6/26	7/30	Bear Cr.	Weir
00223	6/26	7/27	Nikolai Cr.	Stream survey
00232	6/26	8/24	Glacier Flat Cr.	Weir
00242	6/27	8/04	Bear Cr.	Weir
00245	6/27	7/02	Cohoe Beach	Set gill net
00248	6/27	6/28	Cohoe Beach	Set gill net
00254	6/27	8/02	Bear Cr.	Weir
00255	6/27	8/06	Moose Cr.	Stream survey
00285	6/28	7/31	Bear Cr.	Weir
00288	6/28	8/27	Glacier Flat Cr.	Weir
00292	6/28	8/18	Bear Cr.	Weir
00298	6/28	8/06	Moose Cr.	Stream survey
00305	6/28	8/22	Glacier Flat Cr.	Weir
00310	6/28	8/07	Nikolai Cr.	Stream survey
00315	6/28	8/06	Moose Cr.	Stream survey
00326	6/29	8/06	Moose Cr.	Stream survey
00327	6/29	7/27	Nikolai Cr.	Stream survey

-Continued-

Appendix Table 19. Summary of Kasilof sonar site tagged sockeye salmon recoveries, 1984 (continued).

Tag Number	Date Tagged	Date Recovered	Recovery Location	Recovery Method
00331	6/29	8/01	Bear Cr.	Weir
00344	6/29	8/02	Bear Cr.	Weir
00345	6/29	8/06	Moose Cr.	Stream survey
00347	6/29	8/22	Glacier Flat Cr.	Weir
00348	6/29	8/28	Glacier Flat Cr.	Weir
00349	6/29	7/27	Bear Cr.	Weir
00351	6/29	8/02	Bear Cr.	Weir
00352	6/29	7/31	Bear Cr.	Weir
00353	6/29	7/27	Bear Cr.	Weir
00357	6/29	8/06	Moose Cr.	Stream survey
00358	6/29	8/18	Bear Cr.	Weir
00359	6/29	8/06	Moose Cr.	Stream survey
00362	6/30	7/30	Bear Cr.	Weir
00368	6/30	8/06	Moose Cr.	Stream survey
00369	6/30	8/06	Moose Cr.	Stream survey
00372	6/30	8/22	Glacier Flat Cr.	Weir
00374	6/30	8/06	Moose Cr.	Stream survey
00375	6/30	7/28	Bear Cr.	Weir
00378	6/30	8/05	Bear Cr.	Weir
00380	6/30	8/08	Glacier Flat Cr.	Weir
00384	6/30	8/06	Moose Cr.	Stream survey
00387	6/30	8/08	Glacier Flat Cr.	Weir
00393	7/01	8/06	Moose Cr.	Stream survey
00395	7/01	8/05	Bear Cr.	Weir
00401	7/02	8/25	Glacier Flat Cr.	Weir
00404	7/02	7/29	Bear Cr.	Weir
00407	7/02	8/22	Glacier Flat Cr.	Weir
00408	7/02	8/22	Glacier Flat Cr.	Weir
00416	7/02	8/04	Bear Cr.	Weir
00420	7/02	8/02	Bear Cr.	Weir
00421	7/02	7/27	Bear Cr.	Weir
00426	7/03	8/09	Glacier Flat Cr.	Weir
00428	7/03	8/22	Glacier Flat Cr.	Weir
00437	7/03	8/01	Bear Cr.	Weir
00440	7/03	8/22	Glacier Flat Cr.	Weir
00445	7/03	7/02	Lower Subdistrict	Drift gill net
00449	7/03	7/16 or 7/18	Kalifonsky Beach	Set gill net
00451	7/03	8/03	Bear Cr.	Weir
00454	7/03	8/08	Glacier Flat Cr.	Weir
00462	7/04	8/02	Bear Cr.	Weir
00464	7/04	8/23	Glacier Flat Cr.	Weir
00465	7/04	7/09	Kalifonsky Beach	Set gill net
00467	7/04	8/22	Glacier Flat Cr.	Weir
00470	7/04	8/17	Glacier Flat Cr.	Weir
00472	7/04	8/27	Glacier Flat Cr.	Weir
00473	7/04	7/09	Kalifonsky Beach	Set gill net
00477	7/04	8/18	Bear Cr.	Weir

-Continued-

Appendix Table 19. Summary of Kasilof sonar site tagged sockeye salmon recoveries, 1984 (continued).

Tag Number	Date Tagged	Date Recovered	Recovery Location	Recovery Method
00483	7/04	8/18	Bear Cr.	Weir
00484	7/04	8/06	Moose Cr.	Stream survey
00487	7/04	8/01	Bear Cr.	Weir
00488	7/04	7/11	Cohoe Beach	Set gill net
00490	7/04	8/04	Bear Cr.	Weir
00493		8/02	Bear Cr.	Weir
00499	7/05	8/21	Seepage Cr.	Stream survey
00501	7/05	8/20	Bear Cr.	Weir
00505	7/05	8/09	Bear Cr.	Weir
00506	7/05	8/03	Bear Cr.	Weir
00507	7/05	8/22	Glacier Flat Cr.	Weir
00509	7/05	8/11	Bear Cr.	Weir
00510	7/05	7/30	Bear Cr.	Weir
00511	7/05	8/04	Bear Cr.	Weir
00517	7/05	8/22	Glacier Flat Cr.	Weir
00525	7/05	8/07	Nikolai Cr.	Stream survey
00526	7/05	8/22	Glacier Flat Cr.	Weir
00529	7/05	8/18	Bear Cr.	Weir
00534	7/05	8/23	Glacier Flat Cr.	Weir
00548	7/05	None	Crooked Cr.	Weir
00555	7/05	None	Crooked Cr.	Weir
00561	7/05	8/25	Glacier Flat Cr.	Weir
00563	7/05	7/16		Set gill net
00566	7/05	8/07	Nikolai Cr.	Stream survey
00567	7/05	7/29	Bear Cr.	Weir
00570	7/05	8/21	Clear Cr.	Stream survey
00577	7/05	None	Moose Cr.	Hook and line
00593	7/06	8/06	Moose Cr.	Stream survey
00594	7/06	7/30	Bear Cr.	Weir
00596	7/06	8/05	Bear Cr.	Weir
00599	7/06	8/22	Glacier Flat Cr.	Weir
00600	7/06	8/17	Bear Cr.	Weir
00601	7/06	8/08	Glacier Flat Cr.	Weir
00604	7/06	7/30	Bear Cr.	Weir
00605	7/06	8/22	Glacier Flat Cr.	Weir
00607	7/06	8/17	Glacier Flat Cr.	Weir
00608	7/06	8/27	Glacier Flat Cr.	Weir
00613	7/06	8/06	Moose Cr.	Stream survey
00624	7/06	8/22	Glacier Flat Cr.	Weir
00634	7/06	7/27	Nikolai Cr.	Stream survey
00636	7/06	7/30	Bear Cr.	Weir
00638	7/06	7/29	Bear Cr.	Weir
00640	7/06	8/06	Moose Cr.	Stream survey
00641	7/06	8/06	Moose Cr.	Stream survey
00644	7/06	7/27	Bear Cr.	Weir
00645	7/06	7/09	Cohoe Beach	Set gill net
00649	7/06	8/06	Bear Cr.	Weir

-Continued-

Appendix Table 19. Summary of Kasilof sonar site tagged sockeye salmon recoveries, 1984 (continued).

Tag Number	Date Tagged	Date Recovered	Recovery Location	Recovery Method
00650	7/06	8/11	Glacier Flat Cr.	Weir
00652	7/06	8/06	Moose Cr.	Stream survey
00657	7/07	8/12	Glacier Flat Cr.	Weir
00663	7/07	8/06	Moose Cr.	Stream survey
00666	7/07	8/09	Nikolai Cr.	Stream survey
00668	7/07	8/07	Bear Cr.	Weir
00670	7/07	8/02	Bear Cr.	Weir
00671	7/07	8/24	Glacier Flat Cr.	Weir
00675	7/07	8/13	Glacier Flat Cr.	Weir
00676	7/07	8/06	Moose Cr.	Stream survey
00678	7/07	8/22	Glacier Flat Cr.	Weir
00682	7/07	7/29	Bear Cr.	Weir
00689	7/07	8/01	Bear Cr.	Weir
00697	7/07	7/09	Cohoe Beach	Set gill net
00706	7/07	7/27	Bear Cr.	Weir
00710	7/07	None	Cohoe Beach	Set gill net
00711	7/07	8/22	Glacier Flat Cr.	Weir
00714	7/07	8/05	Bear Cr.	Weir
00715	7/07	8/18	Bear Cr.	Weir
00725	7/07	8/10	Glacier Flat Cr.	Weir
00727	7/07	None	Moose Cr.	Unknown
00729	7/07	8/22	Glacier Flat Cr.	Weir
00731	7/07	8/07	Bear Cr.	Weir
00733	7/07	7/21	Nikolai Cr.	Stream survey
00734	7/07	7/27	Nikolai Cr.	Stream survey
00735	7/07	8/22	Glacier Flat Cr.	Stream survey
00736	7/07	8/06	Moose Cr.	Stream survey
00737	7/07	8/08	Glacier Flat Cr.	Weir
00741	7/07	8/06	Moose Cr.	Stream survey
00742	7/07	7/27	Nikolai Cr.	Stream survey
00743	7/07	7/30	Bear Cr.	Weir
00746	7/07	8/10	Bear Cr.	Weir
00748	7/07	8/07	Nikolai Cr.	Stream survey
00749	7/07	8/13	Glacier Flat Cr.	Weir
00752	7/07	7/31	Bear Cr.	Weir
00753	7/07	8/06	Moose Cr.	Stream survey
00754	7/07	8/03	Bear Cr.	Weir
00755	7/07	7/27	Bear Cr.	Weir
00757	7/07	8/06	Bear Cr.	Weir
00759	7/07	8/01	Bear Cr.	Weir
00761	7/07	8/19	Glacier Flat Cr.	Weir
00764	7/08	8/22	Glacier Flat Cr.	Weir
00765	7/08	8/22	Glacier Flat Cr.	Weir
00767	7/08	8/07	Nikolai Cr.	Stream survey
00770	7/08	8/25	Glacier Flat Cr.	Weir
00776	7/08	8/22	Glacier Flat Cr.	Weir
00777	7/08	8/10	Glacier Flat Cr.	Weir

-Continued-

Appendix Table 19. Summary of Kasilof sonar site tagged sockeye salmon recoveries, 1984 (continued).

Tag Number	Date Tagged	Date Recovered	Recovery Location	Recovery Method
00782	7/08	7/31	Bear Cr.	Weir
00791	7/08	8/15	Bear Cr.	Weir
00792	7/08	8/17	Bear Cr.	Weir
00794	7/08	8/19	Glacier Flat Cr.	Weir
00795	7/08	8/03	Bear Cr.	Weir
00796	7/08	8/17	Bear Cr.	Weir
00797	7/08	7/27	Bear Cr.	Weir
00802	7/08	7/29	Bear Cr.	Weir
00806	7/08	8/22	Glacier Flat Cr.	Weir
00808	7/08	8/21	Glacier Flat Cr.	Weir
00809	7/08	8/01	Bear Cr.	Weir
00811	7/08	8/11	Bear Cr.	Weir
00816	7/08	8/07	Nikolai Cr.	Stream survey
00819	7/08	8/11	Glacier Flat Cr.	Weir
00826	7/08	8/02	Bear Cr.	Weir
00827	7/08	7/27	Bear Cr.	Weir
00835	7/08	7/13 or 7/16	Kalifonsky Beach	Set gill net
00838	7/08	8/10	Glacier Flat Cr.	Weir
00841	7/08	8/02	Bear Cr.	Weir
00842	7/08	8/01	Bear Cr.	Weir
00844	7/08	8/08	Glacier Flat Cr.	Weir
00846	7/08	7/29	Bear Cr.	Weir
00852	7/08	8/01	Bear Cr.	Weir
00855	7/08	8/17	Bear Cr.	Weir
00856	7/08	7/31	Bear Cr.	Weir
00859	7/08	8/01	Bear Cr.	Weir
00861	7/08	8/22	Glacier Flat Cr.	Weir
00862	7/08	8/02	Bear Cr.	Weir
00865	7/08	8/21	Seepage Cr.	Stream survey
00870	7/08	8/06	Moose Cr.	Stream survey
00881	7/11	8/02	Bear Cr.	Weir
00884	7/11	8/22	Glacier Flat Cr.	Weir
00885	7/11	8/04	Bear Cr.	Weir
00889	7/11	8/22	Glacier Flat Cr.	Weir
00892	7/11	8/08	Glacier Flat Cr.	Weir
00893	7/11	8/12 or 8/13	Bear Cr.	Weir
00895	7/11	8/05	Bear Cr.	Weir
00897	7/11	8/22	Glacier Flat Cr.	Weir
00905	7/11	8/05	Bear Cr.	Weir
00906	7/11	8/09	Bear Cr.	Weir
00912	7/11	8/12	Bear Cr.	Weir
00917	7/11	8/02	Bear Cr.	Weir
00919	7/11	8/13	Bear Cr.	Weir
00920	7/11	8/06	Moose Cr.	Stream survey
00922	7/11	8/16	Glacier Flat Cr.	Weir
00923	7/11	8/22	Glacier Flat Cr.	Weir
00936	7/11	8/11	Bear Cr.	Weir

-Continued-

Appendix Table 19. Summary of Kasilof sonar site tagged sockeye salmon recoveries, 1984 (continued).

Tag Number	Date Tagged	Date Recovered	Recovery Location	Recovery Method
00939	7/11	8/22	Glacier Flat Cr.	Weir
00940	7/11	8/08	Glacier Flat Cr.	Weir
00943	7/11	8/12	Glacier Flat Cr.	Weir
00947	7/11	8/08	Bear Cr.	Weir
00953	7/11	8/22	Glacier Flat Cr.	Weir
00956	7/11	8/18	Bear Cr.	Weir
00957	7/11	7/13	Kalifonsky Beach	Set gill net
00960	7/11	8/06	Bear Cr.	Weir
00967	7/11	7/31	Bear Cr.	Weir
00970	7/11	8/22	Glacier Flat Cr.	Weir
00973	7/11	8/22	Glacier Flat Cr.	Weir
00977	7/11	8/18	Bear Cr.	Weir
00981	7/11	8/09	Bear Cr.	Weir
00983	7/11	8/13	Glacier Flat Cr.	Weir
00986	7/12	8/22	Glacier Flat Cr.	Weir
00989	7/12	8/07	Nikolai Cr.	Stream survey
00993	7/12	8/17	Bear Cr.	Weir
00994	7/12	8/08	Glacier Flat Cr.	Weir
01001	7/12	8/13	Bear Cr.	Weir
01003	7/12	7/31	Bear Cr.	Weir
01005	7/12	8/21	Seepage Cr.	Stream survey
01016	7/12	8/22	Glacier Flat Cr.	Weir
01023	7/12	7/16	Kalifonsky Beach	Set gill net
01027	7/12	8/06	Bear Cr.	Weir
01029	7/12	8/22	Glacier Flat Cr.	Weir
01030	7/12	7/09	Kalifonsky Beach	Set gill net
01041	7/12	8/22	Glacier Flat Cr.	Weir
01047	7/12	7/13	Kalifonsky Beach	Set gill net
01049	7/12	8/01	Bear Cr.	Weir
01053	7/12	8/10	Bear Cr.	Weir
01058	7/12	8/09	Glacier Flat Cr.	Weir
01062	7/12	8/11	Glacier Flat Cr.	Weir
01063	7/12	8/25	Glacier Flat Cr.	Weir
01064	7/12	8/22	Glacier Flat Cr.	Weir
01073	7/13	8/10	Bear Cr.	Weir
01077	7/13	8/20	Glacier Flat Cr.	Weir
01080	7/13	8/21	Seepage Cr.	Stream survey
01084	7/13	8/11	Glacier Flat Cr.	Weir
01085	7/13	8/06	Moose Cr.	Stream survey
01089	7/13	8/17	Glacier Flat Cr.	Weir
01092	7/13	8/01	Bear Cr.	Weir
01093	7/13	8/21	Seepage Cr.	Stream survey
01095	7/13	8/22	Glacier Flat Cr.	Weir
01102	7/13	8/08	Glacier Flat Cr.	Weir
01107	7/13	8/23	Glacier Flat Cr.	Weir
01115	7/13	8/21	Glacier Flat Cr.	Weir
01116	7/13	8/08	Bear Cr.	Weir

-Continued-

Appendix Table 19. Summary of Kasilof sonar site tagged sockeye salmon recoveries, 1984 (continued).

Tag Number	Date Tagged	Date Recovered	Recovery Location	Recovery Method
01118	7/13	8/08	Bear Cr.	Weir
01123	7/13	8/10	Glacier Flat Cr.	Weir
01129	7/13	8/21	Seepage Cr.	Stream survey
01133	7/13	8/13	Bear Cr.	Weir
01137	7/13	8/21	Glacier Flat Cr.	Weir
01145	7/13	8/05	Bear Cr.	Weir
01148	7/13	8/22	Glacier Flat Cr.	Weir
01149	7/14	8/11	Glacier Flat Cr.	Weir
01158	7/14	8/10	Bear Cr.	Weir
01160	7/14	8/23	Glacier Flat Cr.	Weir
01176	7/14	8/08	Bear Cr.	Weir
01180	7/14	8/01	Bear Cr.	Weir
01181	7/14	7/27	Bear Cr.	Weir
01186	7/14	8/22	Glacier Flat Cr.	Weir
01189	7/15	8/16	Bear Cr.	Weir
01190	7/15	8/08	Glacier Flat Cr.	Weir
01191	7/15	8/25	Glacier Flat Cr.	Weir
01192	7/15	8/22	Glacier Flat Cr.	Weir
01194	7/15	8/09	Bear Cr.	Weir
01198	7/15	8/13	Bear Cr.	Weir
01200	7/15	8/20	Glacier Flat Cr.	Weir
01203	7/15	8/07	Nikolai Cr.	Stream survey
01206	7/15	8/22	Glacier Flat Cr.	Weir
01211	7/15	8/07	Bear Cr.	Weir
01213	7/15	8/21	Glacier Flat Cr.	Weir
01214	7/15	8/22	Glacier Flat Cr.	Weir
01218	7/15	7/22	Kasilof R.	Unknown
01219	7/15	8/06	Bear Cr.	Weir
01220	7/15	8/22	Glacier Flat Cr.	Weir
01224	7/15	8/15	Bear Cr.	Weir
01226	7/15	8/17	Bear Cr.	Weir
01227	7/15	8/11	Glacier Flat Cr.	Weir
01230	7/15	8/24	Glacier Flat Cr.	Weir
01232	7/15	8/10	Glacier Flat Cr.	Weir
01234	7/15	8/06	Moose Cr.	Stream survey
01235	7/15	8/22	Glacier Flat Cr.	Weir
01242	7/15	8/29	Moose Cr.	Stream survey
01244	7/15	8/23	Glacier Flat Cr.	Weir
01248	7/15	8/06	Moose Cr.	Stream survey
01251	7/15	8/22	Glacier Flat Cr.	Weir
01255	7/15	8/21	Seepage Cr.	Stream survey
01256	7/15	8/28	Glacier Flat Cr.	Weir
01258	7/15	8/09	Bear Cr.	Weir
01259	7/15	8/18	Bear Cr.	Weir
01260	7/15	None	Cohoe Beach	Set gill net
01262	7/15	8/22	Glacier Flat Cr.	Weir
01264	7/15	8/05	Bear Cr.	Weir

-Continued-

Appendix Table 19. Summary of Kasilof sonar site tagged sockeye salmon recoveries, 1984 (continued).

Tag Number	Date Tagged	Date Recovered	Recovery Location	Recovery Method
01266	7/15	8/02	Bear Cr.	Weir
01271	7/15	8/17	Glacier Flat Cr.	Weir
01279	7/15	8/18	Glacier Flat Cr.	Weir
01282	7/15	8/09	Seepage Cr.	Stream survey
01284	7/15	8/07	Nikolai Cr.	Stream survey
01287	7/15	7/06	Lower Subdistrict	Drift gill net
01313	7/17	8/13	Bear Cr.	Weir
01317	7/17	8/25	Glacier Flat Cr.	Weir
01333	7/17	8/19	Bear Cr.	Weir
01337	7/17	8/05	Bear Cr.	Weir
01341	7/17	8/03	Bear Cr.	Weir
01348	7/17	8/11	Glacier Flat Cr.	Weir
01350	7/17	7/29	Bear Cr.	Weir
01352	7/17	8/22	Glacier Flat Cr.	Weir
01362	7/17	8/18	Bear Cr.	Weir
01366	7/17	8/22	Glacier Flat Cr.	Weir
01386	7/17	8/13	Glacier Flat Cr.	Weir
01387	7/17	8/22	Glacier Flat Cr.	Weir
01388	7/17	8/11	Bear Cr.	Weir
01389	7/17	8/04	Bear Cr.	Weir
01401	7/19	8/17	Bear Cr.	Weir
01414	7/19	8/18	Bear Cr.	Weir
01416	7/19	8/17	Bear Cr.	Weir
01417	7/19	8/13	Glacier Flat Cr.	Weir
01418	7/19	8/17	Bear Cr.	Weir
01421	7/19	8/22	Glacier Flat Cr.	Weir
01423	7/19	8/17	Bear Cr.	Weir
01430	7/19	8/24	Crooked Cr.	Weir
01432	7/19	8/18	Crooked Cr.	Weir
01439	7/19	8/17	Crooked Cr.	Weir
01443	7/19	8/12	Glacier Flat Cr.	Weir
01449	7/19	8/20	Glacier Flat Cr.	Weir
01451	7/19	8/22	Glacier Flat Cr.	Weir
01452	7/19	8/21	Seepage Cr.	Stream survey
01460	7/19	8/25	Glacier Flat Cr.	Weir
01464	7/19	8/06	Moose Cr.	Stream survey
01466	7/19	8/19	Glacier Flat Cr.	Weir
01469	7/19	8/22	Glacier Flat Cr.	Weir
01475	7/19	8/17	Bear Cr.	Weir
01476	7/19	8/22	Glacier Flat Cr.	Weir
01478	7/19	8/13	Glacier Flat Cr.	Weir
01490	7/19	8/18	Glacier Flat Cr.	Weir
01499	7/19	8/09	Glacier Flat Cr.	Weir
01502	7/20	8/23	Glacier Flat Cr.	Weir
01507	7/20	8/17	Bear Cr.	Weir
01520	7/20	8/11	Glacier Flat Cr.	Weir
01527	7/20	8/02	Bear Cr.	Weir

-Continued-

Appendix Table 19. Summary of Kasilof sonar site tagged sockeye salmon recoveries, 1984 (continued).

Tag Number	Date Tagged	Date Recovered	Recovery Location	Recovery Method
01529	7/20	8/12	Glacier Flat Cr.	Weir
01530	7/20	8/09	Glacier Flat Cr.	Weir
01535	7/20	8/16	Bear Cr.	Weir
01536	7/20	8/10	Glacier Flat Cr.	Weir
01560	7/20	8/13	Bear Cr.	Weir
01570	7/20	8/15	Glacier Flat Cr.	Weir
01577	7/20	8/29	Moose Cr.	Stream survey
01582	7/20	8/10	Glacier Flat Cr.	Weir
01589	7/20	8/21	Clear Cr.	Stream survey
01612	7/21	8/25	Glacier Flat Cr.	Weir
01617	7/21	8/22	Glacier Flat Cr.	Weir
01618	7/21	8/21	Glacier Flat Cr.	Weir
01619	7/21	8/23	Glacier Flat Cr.	Weir
01620	7/21	8/21	Seepage Cr.	Stream survey
01621	7/21	8/19	Glacier Flat Cr.	Weir
01622	7/21	8/21	Clear Cr.	Stream survey
01623	7/21	8/22	Glacier Flat Cr.	Weir
01629	7/21	8/24	Glacier Flat Cr.	Weir
01634	7/21	8/15	Glacier Flat Cr.	Weir
01639	7/21	8/17	Bear Cr.	Weir
01640	7/21	8/17	Bear Cr.	Weir
01642	7/21	8/13	Bear Cr.	Weir
01644	7/21	8/15	Bear Cr.	Weir
01647	7/21	8/10	Glacier Flat Cr.	Weir
01648	7/21	8/22	Glacier Flat Cr.	Weir
01650	7/21	8/15	Bear Cr.	Weir
01663	7/21	7/20	Kalifonsky Beach	Set gill net
01669	7/21	8/10	Glacier Flat Cr.	Weir
01678	7/21	8/13	Bear Cr.	Weir
01688	7/23	8/18	Bear Cr.	Weir
01690	7/23	8/09	Glacier Flat Cr.	Weir
01692	7/23	8/17	Bear Cr.	Weir
01714	7/23	8/22	Glacier Flat Cr.	Weir
01721	7/23	8/22	Glacier Flat Cr.	Weir
01722	7/23	8/08	Glacier Flat Cr.	Weir
01725	7/23	8/10	Glacier Flat Cr.	Weir
01730	7/23	8/12	Glacier Flat Cr.	Weir
01732	7/23	8/25	Glacier Flat Cr.	Weir
01736	7/23	8/06	Bear Cr.	Weir
01737	7/23	8/23	Glacier Flat Cr.	Weir
01756	7/23	8/17	Bear Cr.	Weir
01757	7/23	8/17	Bear Cr.	Weir
01762	7/23	8/06	Moose Cr.	Stream survey
01766	7/23	8/05	Bear Cr.	Weir
01769	7/24	8/17	Bear Cr.	Weir
01770	7/24	8/26	Glacier Flat Cr.	Weir
01772	7/24	8/12	Glacier Flat Cr.	Weir

-Continued-

Appendix Table 19. Summary of Kasilof sonar site tagged sockeye salmon recoveries, 1984 (continued).

Tag Number	Date Tagged	Date Recovered	Recovery Location	Recovery Method
01776	7/24	8/12	Bear Cr.	Weir
01778	7/24	8/17	Glacier Flat Cr.	Weir
01780	7/24	7/31	Kasilof R. mouth	Dipnet
01781	7/24	8/24	Glacier Flat Cr.	Weir
01786	7/24	8/10	Bear Cr.	Weir
01788	7/24	8/08	Glacier Flat Cr.	Weir
01789	7/24	8/22	Glacier Flat Cr.	Weir
01790	7/24	8/19	Bear Cr.	Weir
01795	7/24	8/16	Bear Cr.	Weir
01804	7/25	8/10	Glacier Flat Cr.	Weir
01805	7/25	8/20	Glacier Flat Cr.	Weir
01810	7/25	8/22	Glacier Flat Cr.	Weir
01824	7/25	7/30	Cohoe Beach	Set gill net
01830	7/25	8/22	Glacier Flat Cr.	Weir
01833	7/25	8/08	Clear Cr.	Stream survey
01838	7/26	8/15	Glacier Flat Cr.	Weir
01848	7/26	8/16	Glacier Flat Cr.	Weir
01849	7/26	8/28	Glacier Flat Cr.	Weir
01850	7/26	8/16	Glacier Flat Cr.	Weir
01853	7/26	8/09	Bear Cr.	Weir
01855	7/26	8/25	Glacier Flat Cr.	Weir
01856	7/26	8/15	Bear Cr.	Weir
01857	7/26	8/26	Glacier Flat Cr.	Weir
01859	7/26	8/15	Glacier Flat Cr.	Weir
01863	7/26	8/22	Glacier Flat Cr.	Weir
01865	7/26	8/27	Bear Cr.	Weir
01869	7/26	8/17	Glacier Flat Cr.	Weir
01870	7/26	7/31	Kasilof R. mouth	Dipnet
01872	7/26	8/24	Glacier Flat Cr.	Weir
01876	7/26	8/29	Moose Cr.	Stream survey
01879	7/26	8/06	Cohoe Beach	Set gill net
01880	7/26	7/09	Lower Subdistrict	Drift gill net
01881	7/26	8/25	Glacier Flat Cr.	Weir
01894	7/26	8/21	Seepage Cr.	Stream survey
01897	7/26	8/16	Bear Cr.	Weir
01942	7/26	8/18	Bear Cr.	Weir

Appendix Table 20. Total number of fish targets and estimated species composition recorded by north bank sonar in the Kasilof River, 10 June through 31 July 1984*.

Date	Fish		Number of Fish							
	Targets	Cum	Sockeye	Cum	Pink	Cum	Coho	Cum	Chinook	Cum
6/10	208	208	204	204	1	1	0	0	3	3
6/11	255	463	250	454	2	3	0	0	3	6
6/12	241	704	236	690	2	5	0	0	3	9
6/13	181	885	178	868	1	6	0	0	2	11
6/14	188	1,073	184	1,052	2	8	0	0	2	13
6/15	269	1,342	264	1,316	2	10	0	0	3	16
6/16	396	1,738	388	1,704	3	13	0	0	5	21
6/17	265	2,003	260	1,964	2	15	0	0	3	24
6/18	312	2,315	306	2,270	2	17	0	0	4	28
6/19	524	2,839	514	2,784	3	20	0	0	7	35
6/20	1,157	3,996	1,135	3,919	7	27	0	0	15	50
6/21	1,288	5,284	1,263	5,182	8	35	0	0	17	67
6/22	1,608	6,892	1,577	6,759	10	45	0	0	21	88
6/23	1,777	8,669	1,743	8,502	11	56	0	0	23	111
6/24	1,837	10,506	1,802	10,304	11	67	0	0	24	135
6/25	674	11,180	661	10,965	4	71	0	0	9	144
6/26	848	12,028	832	11,797	5	76	0	0	11	155
6/27	1,316	13,344	1,274	13,071	21	97	0	0	21	176
6/28	1,693	15,037	1,639	14,710	27	124	0	0	27	203
6/29	1,901	16,938	1,841	16,551	30	154	0	0	30	233
6/30	1,603	18,541	1,552	18,103	26	180	0	0	25	258
7/ 1	1,832	20,373	1,774	19,877	29	209	0	0	29	287
7/ 2	2,327	22,700	2,253	22,130	37	246	0	0	37	324
7/ 3	1,022	23,722	990	23,120	16	262	0	0	16	340
7/ 4	3,865	27,587	3,805	26,925	43	305	0	0	17	357
7/ 5	6,774	34,361	6,674	33,599	67	372	0	0	33	390

-Continued-

Appendix Table 20. Total number of fish targets and estimated species composition recorded by north bank sonar in the Kasilof River, 10 June through 31 July 1984* (continued).

Date	Fish		Number of Fish							
	Targets	Cum	Sockeye	Cum	Pink	Cum	Coho	Cum	Chinook	Cum
7/ 6	4,562	38,923	4,488	38,087	74	446	0	0	0	390
7/ 7	3,500	42,423	3,332	41,419	126	572	0	0	42	432
7/ 8	6,642	49,065	6,585	48,004	57	629	0	0	0	432
7/ 9	8,816	57,881	8,712	56,716	52	681	0	0	52	484
7/10	5,765	63,646	5,693	62,409	72	753	0	0	0	484
7/11	2,766	66,412	2,627	65,036	35	788	0	0	104	588
7/12	560	66,972	532	65,568	7	795	0	0	21	609
7/13	1,718	68,690	1,658	67,226	30	825	0	0	30	639
7/14	2,476	71,166	2,390	69,616	43	868	0	0	43	682
7/15	4,586	75,752	4,427	74,043	79	947	0	0	80	762
7/16	5,971	81,723	5,869	79,912	44	991	0	0	58	820
7/17	5,481	87,204	5,410	85,322	0	991	24	24	47	867
7/18	4,760	91,964	4,703	90,025	38	1,029	0	24	19	886
7/19	5,968	97,932	5,931	95,956	18	1,047	0	24	19	905
7/20	4,954	102,886	4,954	100,910	0	1,047	0	24	0	905
7/21	4,621	107,507	4,514	105,424	13	1,060	54	78	40	945
7/22	2,853	110,360	2,787	108,211	8	1,068	33	111	25	970
7/23	2,095	112,455	1,885	110,096	105	1,173	29	140	76	1,046
7/24	3,527	115,982	3,174	113,270	177	1,350	48	188	128	1,174
7/25	3,161	119,143	2,845	116,115	158	1,508	43	231	115	1,289
7/26	2,419	121,562	2,177	118,292	121	1,629	33	264	88	1,377
7/27	1,621	123,183	507	118,799	1,114	2,743	0	264	0	1,377
7/28	1,435	124,618	448	119,247	987	3,730	0	264	0	1,377
7/29	1,408	126,026	440	119,687	968	4,698	0	264	0	1,377
7/30	1,678	127,704	524	120,211	1,154	5,852	0	264	0	1,377
7/31	856	128,560	267	120,478	589	6,441	0	264	0	1,377
Total	128,560		120,478		6,441		264		1,377	

* Sonar counts apportioned by fishwheel catch. Round-off error estimated (worst case) +/- 1 fish per day.

Appendix Table 21. Total number of fish targets and estimated species composition recorded by south bank sonar in the Kasilof River, 10 June through 31 July 1984*.

Date	Fish Targets	Cum	Number of fish							
			Sockeye	Cum	Pink	Cum	Coho	Cum	Chinook	Cum
6/10	92	92	80	80	0	0	0	0	12	12
6/11	105	197	92	172	0	0	0	0	13	25
6/12	141	338	123	295	0	0	0	0	18	43
6/13	115	453	101	396	0	0	0	0	14	57
6/14	154	607	135	531	0	0	0	0	19	76
6/15	216	823	189	720	0	0	0	0	27	103
6/16	299	1,122	261	981	0	0	0	0	38	141
6/17	177	1,299	155	1,136	0	0	0	0	22	163
6/18	146	1,445	128	1,264	0	0	0	0	18	181
6/19	245	1,690	214	1,478	0	0	0	0	31	212
6/20	316	2,006	276	1,754	0	0	0	0	40	252
6/21	636	2,642	556	2,310	0	0	0	0	80	332
6/22	626	3,268	547	2,857	0	0	0	0	79	411
6/23	662	3,930	579	3,436	0	0	0	0	83	494
6/24	858	4,788	750	4,186	0	0	0	0	108	602
6/25	671	5,459	587	4,773	0	0	0	0	84	686
6/26	614	6,073	537	5,310	0	0	0	0	77	763
6/27	774	6,847	677	5,987	0	0	0	0	97	860
6/28	897	7,744	784	6,771	0	0	0	0	113	973
6/29	1,032	8,776	902	7,673	0	0	0	0	130	1,103
6/30	1,145	9,921	1,078	8,751	51	51	0	0	16	1,119
7/ 1	1,446	11,367	1,361	10,112	65	116	0	0	20	1,139
7/ 2	954	12,321	898	11,010	43	159	0	0	13	1,152
7/ 3	718	13,039	676	11,686	32	191	0	0	10	1,162
7/ 4	1,042	14,081	981	12,667	47	238	0	0	14	1,176
7/ 5	2,553	16,634	2,403	15,070	115	353	0	0	35	1,211

-Continued-

Appendix Table 21. Total number of fish targets and estimated species composition recorded by south bank sonar in the Kasilof River, 10 June through 31 July 1984* (continued).

Date	Fish		Number of fish							
	Targets	Cum	Sockeye	Cum	Pink	Cum	Coho	Cum	Chinook	Cum
7/ 6	1,831	18,465	1,588	16,658	231	584	0	0	12	1,223
7/ 7	1,440	19,905	1,249	17,907	181	765	0	0	10	1,233
7/ 8	3,338	23,243	2,896	20,803	420	1,185	0	0	22	1,255
7/ 9	4,372	27,615	3,793	24,596	550	1,735	0	0	29	1,284
7/10	2,254	29,869	2,127	26,723	114	1,849	0	0	13	1,297
7/11	2,011	31,880	1,898	28,621	102	1,951	0	0	11	1,308
7/12	623	32,503	588	29,209	31	1,982	0	0	4	1,312
7/13	958	33,461	904	30,113	49	2,031	0	0	5	1,317
7/14	1,933	35,394	1,824	31,937	98	2,129	0	0	11	1,328
7/15	4,954	40,348	4,676	36,613	250	2,379	0	0	28	1,356
7/16	8,193	48,541	7,733	44,346	414	2,793	0	0	46	1,402
7/17	5,972	54,513	5,566	49,912	111	2,904	0	0	295	1,697
7/18	6,399	60,912	5,964	55,876	119	3,023	0	0	316	2,013
7/19	7,624	68,536	7,106	62,982	142	3,165	0	0	376	2,389
7/20	6,272	74,808	5,846	68,828	116	3,281	0	0	310	2,699
7/21	4,901	79,709	4,568	73,396	91	3,372	0	0	242	2,941
7/22	5,247	84,956	4,585	77,981	458	3,830	51	51	153	3,094
7/23	3,590	88,546	3,137	81,118	314	4,144	34	85	105	3,199
7/24	4,846	93,392	4,234	85,352	424	4,568	47	132	141	3,340
7/25	3,136	96,528	2,740	88,092	274	4,842	31	163	91	3,431
7/26	3,207	99,735	2,802	90,894	280	5,122	32	195	93	3,524
7/27	1,630	101,365	1,424	92,318	143	5,265	16	211	47	3,571
7/28	1,679	103,044	1,467	93,785	147	5,412	16	227	49	3,620
7/29	1,373	104,417	1,200	94,985	120	5,532	13	240	40	3,660
7/30	1,019	105,436	890	95,875	89	5,621	10	250	30	3,690
7/31	727	106,163	635	96,510	64	5,685	7	257	21	3,711
Total	106,163		96,510		5,685		257		3,711	

* Sonar counts apportioned by fishwheel catch. Round-off error estimated (worst case) +/- 1 fish per day.

Appendix Table 22. Kasilof River north bank side-scan sonar counts by sector, 10 June through 31 July 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
6 10	57	38	35	2	0	0	2	1	1	8	34	30	208	208
6 11	33	49	40	2	0	0	9	11	4	18	43	46	255	463
6 12	67	47	31	3	0	0	0	3	6	11	45	28	241	704
6 13	53	42	14	0	1	0	2	3	4	14	23	26	182	886
6 14	52	43	25	0	0	0	6	4	1	14	20	20	185	1071
6 15	86	68	35	1	0	0	2	1	9	16	22	29	269	1340
6 16	86	64	35	11	7	6	9	16	24	22	38	55	373	1713
6 17	30	58	26	7	9	2	9	18	33	18	15	42	267	1980
6 18	37	72	34	8	1	1	7	12	21	31	36	51	311	2291
6 19	55	160	71	11	0	0	10	26	31	47	42	71	524	2815
6 20	269	351	105	5	1	0	10	38	63	107	84	124	1157	3972
6 21	283	421	148	24	10	1	14	32	65	80	61	152	1291	5263
6 22	478	530	213	7	3	1	12	32	57	77	77	123	1610	6873
6 23	656	610	193	11	11	10	2	25	30	52	56	120	1776	8649
6 24	853	568	86	5	12	11	3	19	48	58	62	113	1838	10487
6 25	209	260	50	3	2	0	6	6	28	25	23	64	676	11163
6 26	280	332	53	4	1	0	11	23	38	33	40	58	873	12036
6 27	596	470	70	1	0	0	3	7	20	27	40	80	1314	13350
6 28	811	558	57	3	2	1	14	33	52	36	52	78	1697	15047
6 29	1045	598	114	10	3	1	15	15	29	36	14	21	1901	16948
6 30	765	554	168	16	1	2	12	13	17	22	19	14	1603	18551
7 1	1146	507	100	24	1	2	7	11	4	9	9	12	1832	20383
7 2	1817	363	56	11	3	0	9	6	15	17	15	14	2326	22709
7 3	202	509	164	38	7	7	11	10	16	22	13	23	1022	23731
7 4	189	2359	918	125	8	4	38	52	47	49	29	47	3865	27596

-Continued-

Appendix Table 22. Kasilof River north bank side-scan sonar counts by sector, 10 June through 31 July 1984
(continued).

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 5	751	4510	1117	184	11	1	31	49	24	29	30	39	6776	34372
7 6	588	2915	875	85	4	1	17	19	15	9	12	22	4562	38934
7 7	607	1917	709	101	27	0	16	25	31	15	23	29	3500	42434
7 8	1801	3416	1105	149	13	1	27	35	28	24	17	26	6642	49076
7 9	2793	4863	939	112	5	1	20	25	13	21	10	14	8816	57892
7 10	1237	3480	806	119	3	0	31	27	18	17	10	17	5765	63657
7 11	466	1688	411	79	4	0	24	32	28	11	7	16	2766	66423
7 12	98	273	112	25	1	0	9	9	17	9	3	7	563	66986
7 13	995	378	184	19	4	1	19	22	30	21	4	41	1718	68704
7 14	1642	483	208	24	3	1	16	29	20	9	3	39	2477	71181
7 15	3331	734	282	46	35	32	7	28	22	26	10	41	4594	75775
7 16	4295	987	425	28	8	0	15	29	46	30	15	93	5971	81746
7 17	3400	1026	527	167	16	1	34	46	71	53	23	117	5481	87227
7 18	2718	974	510	116	76	31	36	38	62	79	39	80	4759	91986
7 19	3767	1377	691	87	44	0	33	48	100	87	18	70	6322	98308
7 20	3014	1140	371	127	71	35	18	30	45	50	23	28	4952	103260
7 21	3016	895	328	56	36	33	20	48	53	72	26	36	4619	107879
7 22	1981	501	154	20	6	5	21	22	28	44	25	47	2854	110733
7 23	1522	307	76	24	6	0	10	33	27	23	25	42	2095	112828
7 24	2092	1003	95	97	29	24	12	15	36	48	41	31	3523	116351
7 25	1691	1134	118	33	23	1	20	13	26	45	30	28	3162	119513
7 26	1246	820	107	22	10	1	15	29	27	63	32	45	2417	121930
7 27	786	615	77	12	1	3	8	10	19	31	37	23	1622	123552
7 28	680	531	80	15	1	2	14	10	19	32	37	14	1435	124987
7 29	697	481	73	14	4	3	12	10	34	27	32	21	1408	126395

-Continued-

Appendix Table 22. Kasilof River north bank side-scan sonar counts by sector, 10 June through 31 July 1984
(continued).

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 30	787	514	73	25	4	5	30	22	44	60	62	56	1682	128077
7 31	334	232	58	15	15	3	20	11	31	41	58	37	855	128932*
TOTAL	56490	46825	13352	2133	543	234	758	1131	1577	1825	1564	2500	128932*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 23. Kasilof River north bank side-scan sonar counts by sector, five day time periods, 10 June through 31 July 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
6 10-14	262	219	145	7	1	0	19	22	16	65	165	150	1071	1071
6 15-19	294	422	201	38	17	9	37	73	118	134	153	248	1744	2815
6 20-24	2539	2480	745	52	37	23	41	146	263	374	340	632	7672	10487
6 25-29	2941	2218	344	21	8	2	49	84	167	157	169	301	6461	16948
6 30- 4	4119	4292	1406	214	20	15	77	92	99	119	85	110	10648	27596
7 5- 9	6540	17621	4745	631	60	4	111	153	111	98	92	130	30296	57892
7 10-14	4438	6302	1721	266	15	2	99	119	113	67	27	120	13289	71181
7 15-19	17511	5098	2435	444	179	64	125	189	301	275	105	401	27127	98308
7 20-24	11625	3846	1024	324	148	97	81	148	189	237	140	184	18043	116351
7 25-29	5100	3581	455	96	39	10	69	72	125	198	168	131	10044	126395
7 30-31	1121	746	131	40	19	8	50	33	75	101	120	93	2537	128932*
TOTAL	56490	46825	13352	2133	543	234	758	1131	1577	1825	1564	2500	128932*	

*Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 24. Kasilof River south bank side-scan sonar counts by sector, 10 June through 31 July 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
6 10	17	11	4	0	0	0	0	2	7	9	29	13	92	92
6 11	21	9	1	0	0	0	4	5	12	11	11	31	105	197
6 12	30	27	7	2	0	0	1	1	10	22	16	25	141	338
6 13	27	14	1	0	0	0	5	7	6	13	18	24	115	453
6 14	28	23	5	1	0	0	7	2	16	17	29	26	154	607
6 15	63	63	11	3	2	2	5	7	8	17	24	17	222	829
6 16	56	64	22	2	2	1	5	14	27	16	43	47	299	1128
6 17	62	45	8	5	2	1	3	1	2	9	7	30	175	1303
6 18	44	31	6	1	0	0	3	4	4	16	19	18	146	1449
6 19	43	48	14	2	0	0	1	8	17	30	46	36	245	1694
6 20	26	58	19	4	2	2	4	8	17	30	57	87	314	2008
6 21	17	17	1	3	0	2	17	30	56	128	141	217	629	2637
6 22	33	14	11	0	0	0	34	37	75	105	116	196	621	3258
6 23	18	17	2	0	0	1	20	21	62	170	197	154	662	3920
6 24	29	48	7	0	0	2	14	35	89	207	206	221	858	4778
6 25	54	46	11	2	1	0	15	27	67	180	135	133	671	5449
6 26	20	30	10	3	0	0	11	42	72	157	125	144	614	6063
6 27	54	60	23	0	0	0	17	34	78	172	163	173	774	6837
6 28	117	123	40	8	0	0	23	36	96	156	184	114	897	7734
6 29	167	237	86	19	3	4	45	71	73	106	94	128	1033	8767
6 30	99	237	160	71	28	10	86	53	68	158	59	116	1145	9912
7 1	280	420	169	63	28	3	66	59	58	99	66	135	1446	11358
7 2	218	224	87	26	8	1	60	36	72	97	52	73	954	12312
7 3	92	46	42	32	3	3	51	66	89	109	69	123	725	13037
7 4	130	125	51	16	10	8	88	81	110	176	92	154	1041	14078

-Continued-

Appendix Table 24. Kasilof River south bank side-scan sonar counts by sector, 10 June through 31 July 1984.
(continued).

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 5	1259	513	117	49	32	28	50	55	81	124	102	148	2558	16636
7 6	1333	368	18	0	0	0	0	4	4	22	22	60	1831	18467
7 7	1001	264	13	1	0	0	1	0	9	25	36	90	1440	19907
7 8	2569	579	27	0	0	0	0	3	12	37	39	72	3338	23245
7 9	3528	707	34	4	0	0	3	1	9	19	21	46	4372	27617
7 10	1762	389	32	0	0	0	1	3	5	10	19	33	2254	29871
7 11	1508	347	35	0	0	0	1	2	6	21	43	48	2011	31882
7 12	373	113	16	1	0	0	1	1	3	21	27	67	623	32505
7 13	641	155	21	4	2	1	0	2	13	17	27	78	961	33466
7 14	692	1043	63	4	0	0	1	13	10	20	50	38	1934	35400
7 15	1913	2625	142	18	6	1	9	16	27	55	51	91	4954	40354
7 16	3113	4376	275	67	4	2	22	35	40	81	83	94	8192	48546
7 17	2302	2963	292	32	2	1	25	40	57	72	87	100	5973	54519
7 18	1876	3497	566	73	8	2	31	43	51	102	73	77	6399	60918
7 19	915	4349	1473	186	12	1	61	72	106	176	146	127	7624	68542
7 20	801	3667	1228	123	10	3	48	49	57	115	88	83	6272	74814
7 21	742	2571	783	183	105	66	44	56	81	94	87	89	4901	79715
7 22	727	3050	948	122	10	1	34	40	60	93	86	76	5247	84962
7 23	647	1945	518	77	3	2	25	40	52	77	89	115	3590	88552
7 24	1749	2481	373	35	2	1	7	16	28	61	39	54	4846	93398
7 25	1298	1389	186	25	3	1	12	26	24	37	59	76	3136	96534
7 26	1002	1623	260	33	5	1	13	19	50	58	62	81	3207	99741
7 27	414	950	126	8	0	0	5	12	22	10	17	66	1630	101371
7 28	535	839	109	9	2	0	5	8	27	31	39	75	1679	103050
7 29	368	704	81	6	1	1	8	19	22	17	43	103	1373	104423

-Continued-

Appendix Table 24. Kasilof River south bank side-scan sonar counts by sector, 10 June through 31 July 1984.
(continued).

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 30	230	493	85	2	0	0	10	18	19	21	35	105	1018	105441
7 31	151	308	69	3	0	0	9	18	21	12	20	116	727	106168*
TOTAL	35194	44345	8688	1328	296	152	1011	1298	2087	3638	3488	4643	106168*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 25. Kasilof River south bank side-scan sonar counts by sector, five day time periods, 10 June through 31 July, 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
6 10-14	123	84	18	3	0	0	17	17	51	72	103	119	607	607
6 15-19	268	251	61	13	6	4	17	34	58	88	139	148	1087	1694
6 20-24	123	154	40	7	2	7	89	131	299	640	717	875	3084	4778
6 25-29	412	496	170	32	4	4	111	210	386	771	701	692	3989	8767
6 30- 4	819	1052	509	208	77	25	351	295	397	639	338	601	5311	14078
7 5- 9	9690	2431	209	54	32	28	54	63	115	227	220	416	13539	27617
7 10-14	4976	2047	167	9	2	1	4	21	37	89	166	264	7783	35400
7 15-19	10119	17810	2748	376	32	7	148	206	281	486	440	489	33142	68542
7 20-24	4666	13714	3850	540	130	73	158	201	278	440	389	417	24856	93398
7 25-29	3617	5505	762	81	11	3	43	84	145	153	220	401	11025	104423
7 30-31	381	801	154	5	0	0	19	36	40	33	55	221	1745	106168*
TOTAL	35194	44345	8688	1328	296	152	1011	1298	2087	3638	3488	4643	106168*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 26. Kasilof River north bank side-scan sonar counts by hour, 10 June through 31 July 1984.

DATE	HOUR																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
6 10	1	43	49	38	10	4	5	10	10	2	0	0	1	1	5	4	1	0	6	1	5	2	5	5
6 11	49	35	41	33	25	11	10	3	4	10	2	0	1	3	2	0	4	4	0	0	2	5	4	7
6 12	8	49	67	18	13	10	5	7	6	3	2	5	8	4	0	5	5	3	4	4	7	3	0	5
6 13	21	43	10	8	10	11	4	2	4	4	4	4	2	3	0	0	5	8	7	2	10	8	3	9
6 14	27	21	27	10	1	7	12	4	14	1	6	5	0	3	0	1	3	0	2	2	12	15	7	5
6 15	15	18	52	32	7	6	5	8	12	4	6	1	5	3	5	10	8	5	7	3	16	14	10	17
6 16	30	37	63	31	13	7	8	2	10	2	9	12	12	12	12	12	13	19	11	5	7	13	14	19
6 17	32	41	35	18	10	9	5	13	15	7	7	10	6	8	1	9	5	12	4	3	9	0	3	5
6 18	16	43	60	29	12	3	14	13	8	3	23	2	8	12	6	8	13	4	3	5	3	7	1	15
6 19	46	102	99	65	23	8	5	2	6	5	10	16	19	10	6	12	11	6	2	6	8	17	8	32
6 20	77	234	281	115	50	17	9	10	15	4	10	14	19	32	24	25	18	24	17	25	27	21	31	58
6 21	139	292	257	90	52	18	13	17	7	7	10	9	14	29	24	34	39	53	34	34	40	19	29	29
6 22	45	210	497	244	73	34	42	24	23	13	19	36	25	26	16	30	20	18	12	16	23	21	24	119
6 23	119	228	464	196	33	27	13	13	7	3	13	12	18	21	26	38	93	71	44	43	40	53	76	125
6 24	162	239	367	272	117	40	43	62	40	25	31	23	36	19	31	25	28	48	34	43	39	38	42	34
6 25	60	47	47	47	40	17	27	19	18	19	13	17	14	22	31	19	44	51	31	26	21	15	8	23
6 26	24	36	81	110	37	26	17	26	18	25	37	31	38	30	25	32	19	57	40	46	55	33	15	15
6 27	23	58	69	138	66	7	16	44	34	41	31	25	29	37	25	37	41	141	129	84	63	88	66	22
6 28	39	64	54	69	71	32	28	100	68	55	40	23	13	23	28	36	51	140	285	115	131	102	75	55
6 29	44	100	99	116	195	107	28	40	51	86	59	28	41	36	12	6	22	22	107	131	208	183	91	89
6 30	70	103	56	85	72	65	74	40	38	81	83	51	26	46	48	38	24	26	18	81	62	147	159	110
7 1	95	104	89	105	113	60	98	75	25	61	73	54	37	55	54	64	95	70	58	107	139	28	60	113
7 2	101	138	113	150	218	123	125	269	91	74	107	135	119	79	117	86	59	21	40	35	39	45	21	21
7 3	34	48	34	16	18	20	17	18	32	42	17	22	30	33	22	30	17	30	33	35	109	158	185	185
7 4	217	148	87	76	68	82	118	100	116	207	96	72	98	314	196	85	105	135	119	197	177	201	632	219
7 5	184	157	93	82	129	101	72	53	170	354	651	346	152	151	218	441	567	466	546	476	339	346	280	402
7 6	217	130	183	176	147	103	109	115	332	360	205	410	400	135	171	365	456	193	83	104	46	48	42	32
7 7	10	46	26	22	25	52	21	11	31	40	81	80	123	331	202	116	186	328	467	426	350	195	142	189
7 8	262	310	153	102	105	160	208	160	157	480	378	398	241	219	472	228	102	135	235	211	307	548	520	551
7 9	545	438	430	168	136	164	115	111	74	110	288	558	555	680	629	994	661	173	126	441	329	322	374	395
7 10	306	304	386	494	208	141	134	76	80	86	111	181	252	248	286	455	564	236	60	217	319	238	233	150
7 11	128	79	154	211	199	92	88	105	70	113	82	81	111	134	132	123	160	244	143	56	91	78	54	38
7 12	32	35	28	18	55	42	27	24	28	21	19	29	20	18	8	13	27	19	20	16	22	19	10	13
7 13	44	9	36	18	37	121	84	57	70	75	80	88	68	87	82	111	106	118	150	91	40	47	64	35
7 14	28	24	28	32	37	60	84	26	27	49	107	93	83	83	109	257	225	274	334	37	70	61	181	168
7 15	260	202	238	236	279	198	244	200	90	38	75	119	55	249	470	362	189	95	209	332	169	77	55	153
7 16	328	320	308	212	286	272	343	333	131	76	154	264	214	141	248	369	506	241	324	260	272	93	96	180
7 17	303	275	230	117	203	185	273	324	285	130	103	241	376	193	148	225	340	307	258	208	303	249	111	94
7 18	84	214	166	240	246	360	345	247	239	184	209	160	257	159	137	174	187	192	204	134	142	209	152	118
7 19	126	197	122	166	330	306	254	338	393	665	505	386	231	260	223	196	205	185	145	226	247	247	221	148
7 20	178	129	224	243	200	210	222	200	188	271	504	418	247	155	174	207	149	181	181	141	142	102	169	117
7 21	202	139	169	175	269	187	124	136	246	180	149	161	307	250	232	206	301	305	166	161	116	152	105	181
7 22	91	149	108	133	144	175	161	83	107	98	107	72	161	214	134	127	73	77	111	92	157	137	61	82
7 23	131	118	80	82	80	106	131	84	65	65	88	77	81	67	123	57	55	39	70	112	117	125	89	53
7 24	51	79	102	60	75	109	112	77	65	63	144	104	239	229	157	281	371	175	117	178	181	198	177	179
7 25	197	143	160	128	129	158	140	141	113	90	100	60	127	51	135	135	248	231	116	86	104	112	144	114
7 26	49	57	60	114	99	107	135	121	133	103	88	101	101	104	137	117	119	161	122	78	66	71	96	78
7 27	113	89	71	83	107	62	72	65	74	47	26	42	32	39	36	98	111	81	82	65	32	38	52	105
7 28	95	84	58	54	58	108	118	45	44	41	49	58	66	39	29	47	14	25	48	52	61	47	100	95
7 29	93	93	31	41	37	45	173	117	42	58	95	24	59	97	45	35	42	39	35	40	51	21	40	55
7 30	81	50	45	62	68	62	94	200	118	91	69	55	98	85	78	73	52	48	35	36	57	52	48	25
7 31	30	24	36	32	14	15	21	25	41	62	13	36	51	39	48	47	40	37	32	57	35	53	38	29

Appendix Table 27. Kasilof River north bank side-scan sonar counts by hour, five day time periods, 10 June through 31 July 1984.

DATE	H O U R												CUMULATIVE	
	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	TOTAL	TOTAL
6 10-14	297	301	102	62	58	28	26	17	33	28	69	50	1071	1071
6 15-19	380	484	98	75	72	96	95	81	96	49	94	124	1744	2815
6 20-24	1745	2783	461	246	144	177	239	273	412	302	333	557	7672	10487
6 25-29	495	830	598	345	415	304	283	251	588	994	899	459	6461	16948
6 30- 4	1058	811	839	934	747	730	826	743	582	718	982	1678	10648	27596
7 5- 9	2299	1435	1122	975	2108	3395	2987	3836	3267	3115	2830	2927	30296	57892
7 10-14	989	1405	992	705	619	871	1104	1576	1973	1124	985	946	13289	71181
7 15-19	2309	2035	2665	2901	2231	2216	2135	2552	2447	2300	2008	1328	27127	98308
7 20-24	1267	1376	1555	1330	1348	1824	1950	1698	1726	1329	1427	1213	18043	116351
7 25-29	1013	800	910	1127	745	643	715	814	1071	724	603	879	10044	126395
7 30-31	185	175	159	340	312	173	273	246	177	160	197	140	2537	128932*
TOTAL	12037	12435	9501	9040	8799	10457	10633	12087	12372	10843	10427	10301	128932*	

*Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 28. Kasilof River south bank side-scan sonar counts by hour, 10 June through 31 July 1984.

DATE	HOUR																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
6 10	5	9	19	17	1	7	11	1	6	0	0	0	1	1	0	0	1	4	0	4	0	4	0	4	1
6 11	7	11	16	14	5	20	6	2	3	3	1	1	0	0	2	1	0	1	0	0	5	5	1	1	
6 12	10	9	11	16	11	3	6	1	4	5	0	0	1	6	2	7	0	7	8	0	14	1	12	7	
6 13	5	28	11	3	6	6	7	4	5	0	0	3	0	0	3	2	2	2	2	2	7	4	6	7	
6 14	12	22	19	9	3	8	19	19	4	5	2	0	4	0	2	2	0	3	4	3	3	5	2	4	
6 15	12	3	19	8	9	0	4	11	12	3	0	4	1	1	2	12	2	0	16	4	14	34	24	27	
6 16	30	27	26	12	10	11	15	24	27	4	4	5	19	3	14	8	10	6	0	3	13	4	4	20	
6 17	32	19	17	12	4	12	10	15	6	11	6	1	5	0	0	10	0	3	3	2	1	2	2	2	
6 18	6	16	38	6	10	3	29	1	6	2	3	0	0	0	3	1	1	0	5	2	1	0	3	10	
6 19	8	35	40	20	8	5	15	0	5	5	3	8	11	7	6	9	5	7	9	8	17	3	6	5	
6 20	26	36	42	17	17	13	9	6	5	5	1	0	3	3	0	3	6	11	1	4	12	12	29	53	
6 21	104	113	58	27	16	21	14	12	14	12	12	5	30	16	15	15	18	14	24	12	17	11	24	25	
6 22	31	66	68	37	32	40	27	16	13	10	12	11	23	8	24	24	24	15	18	41	18	13	11	39	
6 23	57	52	85	57	31	22	9	3	3	9	3	18	16	18	18	21	41	44	17	25	31	20	24	38	
6 24	60	56	57	76	69	54	44	60	42	31	21	23	36	45	29	16	7	21	9	23	20	26	16	17	
6 25	37	38	46	52	22	39	29	24	23	14	22	25	22	22	20	22	34	42	37	23	30	25	7	16	
6 26	11	17	30	35	28	27	20	18	26	38	41	10	44	22	27	13	15	39	34	26	42	15	25	11	
6 27	24	15	31	47	27	27	21	56	47	44	44	50	38	30	19	21	17	47	26	32	21	38	31	21	
6 28	23	23	21	24	55	41	50	64	63	36	15	11	25	21	15	19	30	55	71	35	59	66	43	32	
6 29	32	41	62	78	94	101	62	46	67	51	27	35	29	19	10	18	17	14	32	24	48	65	26	35	
6 30	36	73	57	71	40	49	69	39	41	73	45	66	42	37	23	29	29	24	26	44	35	78	82	37	
7 1	62	83	109	84	41	42	122	104	95	77	81	59	64	29	37	32	73	26	8	57	40	22	51	48	
7 2	60	68	42	51	36	42	61	50	50	45	37	43	41	50	13	33	23	20	38	23	31	42	25	30	
7 3	38	21	24	16	17	16	19	36	38	29	13	21	27	33	30	24	30	27	37	27	25	59	50	68	
7 4	69	87	58	51	48	45	27	46	33	74	46	43	34	23	32	16	23	20	18	37	25	52	42	92	
7 5	74	99	114	100	67	88	105	99	125	86	108	28	22	27	108	67	67	55	84	114	193	163	186	379	
7 6	196	112	110	122	112	92	152	173	168	153	93	76	35	10	20	71	23	22	20	10	3	17	16	25	
7 7	24	48	49	25	18	25	24	21	11	29	44	8	19	89	31	29	24	44	71	78	65	266	234	164	
7 8	172	147	73	66	77	181	281	294	161	194	112	77	189	142	219	73	84	40	102	138	42	201	128	145	
7 9	159	359	279	175	130	246	272	260	153	124	82	237	409	223	180	329	193	68	41	29	108	111	157	48	
7 10	67	108	197	164	104	119	146	142	121	66	35	46	56	89	79	131	98	52	25	59	80	133	82	55	
7 11	46	81	106	220	159	112	140	195	137	85	50	18	44	28	56	40	73	103	51	25	47	71	81	43	
7 12	29	26	30	28	61	75	45	29	43	8	19	12	15	12	9	7	9	20	13	24	15	29	19	46	
7 13	29	17	14	45	41	90	69	43	43	37	20	18	16	31	14	17	20	24	63	55	91	70	61	33	
7 14	18	11	17	31	24	83	118	63	46	59	28	17	19	19	23	93	123	209	223	173	138	89	130	180	
7 15	193	129	109	110	125	199	448	542	202	84	57	66	106	113	112	362	763	292	210	251	181	86	114	100	
7 16	217	143	210	277	441	844	784	1221	531	171	169	329	479	364	200	157	168	216	215	227	325	201	151	152	
7 17	208	152	117	131	133	276	217	486	592	266	118	150	145	250	216	275	91	180	386	377	623	319	180	85	
7 18	156	153	175	164	300	510	485	468	617	789	388	196	144	135	92	78	112	86	54	45	230	444	321	257	
7 19	125	121	113	107	114	219	335	221	580	562	453	222	168	109	621	456	354	350	239	268	233	455	725	474	
7 20	206	134	172	202	207	215	262	339	329	255	350	235	281	354	383	320	326	280	207	198	170	242	367	238	
7 21	168	119	101	139	122	80	191	193	204	212	96	167	368	204	331	132	218	153	427	204	189	296	399	188	
7 22	227	182	107	107	147	297	698	364	345	246	165	296	101	85	156	334	213	124	114	223	196	175	196	149	
7 23	100	93	142	77	103	194	298	163	166	94	68	54	130	82	145	198	157	69	92	214	228	163	258	302	
7 24	230	191	116	86	139	203	267	248	256	152	271	373	182	249	181	269	198	140	133	144	265	253	185	115	
7 25	86	126	73	119	133	154	216	324	179	150	117	110	147	110	114	131	138	129	59	60	108	84	130	139	
7 26	81	96	127	141	157	179	287	194	245	202	158	137	92	118	64	104	152	145	74	53	87	117	116	81	
7 27	77	49	42	54	93	131	117	18	75	99	66	41	51	40	44	58	90	69	79	74	61	34	92	76	
7 28	68	58	32	49	43	132	137	100	79	130	95	72	50	53	49	15	56	64	78	77	61	41	60	80	
7 29	52	30	30	40	21	51	95	73	122	102	159	88	82	74	35	49	45	34	30	41	33	29	26	32	
7 30	38	10	28	37	32	50	73	127	71	31	62	68	46	22	29	45	35	21	30	30	64	23	22	24	
7 31	24	15	13	10	18	31	26	35	60	44	20	32	38	39	36	35	19	26	26	44	13	38	61	24	

Appendix Table 29. Kasilof River south bank side-scan sonar counts by hour, five day time periods, 10 June through 31 July 1984.

DATE	H O U R												CUMULATIVE	
	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	TOTAL	TOTAL
6 10-14	118	135	70	76	35	7	12	22	16	23	48	45	607	607
6 15-19	188	198	72	124	81	34	47	65	34	52	89	103	1087	1694
6 20-24	601	524	315	200	144	106	198	165	201	174	180	276	3084	4778
6 25-29	261	426	461	390	409	280	272	184	310	340	409	247	3989	8767
6 30- 4	597	563	376	573	555	454	380	269	295	315	409	525	5311	14078
7 5- 9	1390	1113	1036	1681	1204	865	1165	1127	620	687	1169	1482	13539	27617
7 10-14	432	852	868	990	645	263	329	469	731	711	763	730	7783	35400
7 15-19	1597	1513	3161	5207	4394	2148	2013	2569	2612	2272	3097	2559	33142	68542
7 20-24	1650	1249	1707	3023	2259	2075	2036	2449	1878	1956	2177	2397	24856	93398
7 25-29	723	707	1094	1561	1383	1043	817	663	922	625	655	832	11025	104423
7 30-31	87	88	131	261	206	182	145	145	101	130	138	131	1745	106168*
TOTAL	7644	7368	9291	14086	11315	7457	7414	8127	7720	7285	9134	9327	106168*	

*Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 30. Daily fishwheel catch by species on the north bank of the Kasilof River bridge, 18 June through 27 July 1984 1/2/.

Date	Number Wheels	Hours Open	Sockeye	Pink	Coho	Chinook	Other ^{3/}
6/18	1	8					
6/19	1	14	5				
6/20	1	24	16			1	
6/21	1	24	19				
6/22	1	25	15				
6/23	1	24	33				
6/24	1	26	43			1	
6/25	1	21	7	1			
6/26	1	25	15				
6/27	1	23	25			1	1
6/28	1	26	36			1	1
6/29	1	23	24				
6/30	1	24	17				2
7/01	1	27	2				
7/02	1	22	25				
7/03	1	25	115	3		3	3
7/04	1	20	445	5		2	3
7/05	1	9	599	6		3	
7/06	1	3	488	8			
7/07	1	13	159	6		2	1
7/08	1	3	928	8			
7/09	1	9	1,008	6		6	
7/10	1	11	159	2			
7/11	1	29	59	2		5	
7/12	1	17	92			1	
7/13	1	23	74	1		2	
7/14	1	20	36	1		1	
7/15	1	26	57	1			1
7/16	1	24	402	3		4	
7/17	1	23	229		1	2	
7/18	1	24	247	2		1	
7/19	1	26	319	1		1	
7/20	1	26	206				1
7/21	1	23	116		2	2	
7/22	1	22	221	1	2	1	

-Continued-

Appendix Table 30. Daily fishwheel catch by species on the north bank of the Kasilof River bridge, 18 June through 27 July 1984 ^{1/2/} (continued).

Date	Number Wheels	Hours Open	Sockeye	Pink	Coho	Chinook	Other ^{3/}
7/23	1	26	58	2		3	
7/24	1	23	45	1	2	1	
7/25	1	25	29	5		3	
7/26	1	22	66	3	1	1	
7/27	1	5	5	11			
Total			6,444	79	8	49	13

1/ Fishwheel catch adjusted for 24 hours: $\frac{\text{daily catch} \times 24 \text{ hours}}{\text{hours open}}$

2/ Actual catch: sockeye - 3,907; pink - 44; coho - 8; chinook - 40; other - 13.

3/ Other species is Dolly Varden trout.

Appendix Table 31. Daily fishwheel catch by species on the south bank of the Kasilof River, 17 June through 27 July 1984 1/2/.

Date	Number Wheels	Hours Open	Sockeye	Pink	Coho	Chinook	Other ^{3/}
6/17	1	5				5	
6/18	1	14	3				
6/19	1	21	5			2	
6/20	1	25	3				
6/21	1	24	3			1	
6/22	1	25	17			1	2
6/23	1	23	12				
6/24	1	25	14			6	
6/25	1	24	19			1	
6/26	1	25	14			1	
6/27	1	24	13			1	
6/28	1	24	20			1	
6/29	1	24	16			1	
6/30	1	24	13				1
7/01	1	28	4				
7/02	1	21	9				1
7/03	1	24	35	3		1	
7/04	1	23	75	1			
7/05	1	21	72	6		2	3
7/06	1	29	8				
7/07	1	24	32	2		1	1
7/08	1	12	40	8			
7/09	1	16	51	9			
7/10	1	27	23				
7/11	1	26	29	5			
7/12	1	19	20	1			
7/13	1	25	12	1			
7/14	1	22	9				
7/15	1	25	37	2		1	
7/16	1	28	38				
7/17	1	22	27			2	
7/18	1	22	26			1	
7/19	1	26	47	3		2	
7/20	1	23	25			2	
7/21	1	24	26			1	

-Continued-

Appendix Table 31. Daily fishwheel catch by species on the south bank of the Kasilof River, 17 June through 27 July 1984 ^{1/2/} (continued).

Date	Number Wheels	Hours Open	Sockeye	Pink	Coho	Chinook	Other ^{3/}
7/22	1	24	47	1			
7/23	1	26	14	1	1	3	
7/24	1	23	15	2			
7/25	1	25	4	3			
7/26	1	24	7	2			
7/27	1	25	3				
Total			887	50	1	35	8

1/ Fishwheel catch adjusted for 24 hours: $\frac{\text{daily catch} \times 24 \text{ hours}}{\text{hours open}}$

2/ Actual catch: sockeye - 842; pink - 42; coho - 1; chinook - 33; other - 8.

3/ Other species in Dolly Varden trout.

Appendix Table 32. Length composition of the major age classes of sockeye salmon collected in the Kasilof River, 1976-1984.

Year	Age Class	Male			Female			Total			Ratio Male-Female
		Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	
1976	1.2	486	3.9	26	472	10.9	40	478	--	66	0.7:1
1978		--	--	69	--	--	70	501	3.1	139	1.0:1
1979		489	2.0	175	487	2.0	139	488	1.5	314	1.3:1
1980		474	2.4	189	464	1.2	376	467	--	565	0.5:1
1981		503	2.0	241	492	2.5	146	499	--	387	1.7:1
1982		481	2.2	285	466	1.8	235	474	2.0	475	1.2:1
1983		493	1.9	113	491	2.5	78	492	1.5	191	1.4:1
1984		480	1.2	544	478	1.1	428	479	0.8	972	2.6:1
1976	1.3	528	13.4	5	547	7.5	4	536	--	9	1.3:1
1978		--	--	47	--	--	55	554	2.4	102	0.9:1
1979		578	3.2	82	562	3.3	99	569	2.4	181	0.8:1
1980		531	6.8	35	516	2.4	115	520	--	150	0.3:1
1981		566	1.2	422	558	1.4	369	562	--	791	1.1:1
1982		549	1.4	377	542	1.1	428	545	1.2	805	0.9:1
1983		558	1.9	170	547	1.9	187	552	1.3	357	0.9:1
1984		539	1.4	304	533	1.3	383	535	0.9	687	0.8:1

-Continued-

Appendix Table 32. Length composition of the major age classes of sockeye salmon collected in the Kasilof River, 1976-1984 (continued).

Year	Age Class	Male			Female			Total			Ratio Male-Female
		Average Length (mm) ^{1/}	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	
1976	2.2	485	6.1	12	487	3.1	34	436	--	46	0.4:1
1982		479	3.2	65	472	2.7	81	475	2.9	146	0.8:1
1984		484	1.8	202	482	1.4	223	483	1.1	425	0.9:1
1982	2.3	543	4.3	41	543	3.8	40	546	4.1	86	1.0:1
1984		533	2.6	102	526	3.0	80	530	2.0	182	1.3:1

^{1/} Lengths measured from mid-eye to fork of tail.

Appendix Table 33. Weight composition of the major age classes of sockeye salmon collected in the Kasilof River, 1981-1984.

Year	Age Class	Male			Female			Total		
		Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size
1981	1.2	2.2	0.05	241	1.9	0.03	146	2.1	--	387
1982		1.8	0.03	235	1.5	0.02	240	1.7	0.03	475
1983		2.04	0.06	113	1.84	0.03	78	1.96	0.04	191
1984		1.86	0.03	101	1.81	0.04	39	1.85	0.02	140
1981	1.3	3.0	0.04	422	2.9	0.03	369	3.0	--	791
1982		2.7	0.02	377	2.44	0.02	428	2.56	0.02	805
1983		2.78	0.03	168	2.47	0.02	187	2.62	0.02	355
1984		2.67	0.03	146	2.53	0.03	182	2.59	0.02	328
1981	2.2	2.3	0.08	40	2.0	0.07	33	2.2	--	73
1982		1.7	0.05	65	1.6	0.04	81	1.7	0.04	146
1984		2.07	0.10	31	1.79	0.05	27	1.95	0.06	58
1982	2.3	2.6	0.07	41	2.3	0.5	34	2.5	0.06	75
1984		2.72	0.10	32	2.63	0.14	31	2.68	0.09	63

Appendix Table 34. Total number of fish targets and estimated species composition recorded by side-scan sonar in the Crescent River, 15 June through 31 July 1984*.

Date	Fish		Number of Fish					
	Targets	Cum	Sockeye	Cum	Chum	Cum	Coho	Cum
6/15	52	52	52	52	0	0	0	0
6/16	67	119	67	119	0	0	0	0
6/17	127	246	127	246	0	0	0	0
6/18	104	350	104	350	0	0	0	0
6/19	53	403	53	403	0	0	0	0
6/20	136	539	136	539	0	0	0	0
6/21	353	892	353	892	0	0	0	0
6/22	486	1,378	486	1,378	0	0	0	0
6/23	619	1,997	619	1,997	0	0	0	0
6/24	417	2,414	417	2,414	0	0	0	0
6/25	440	2,854	440	2,854	0	0	0	0
6/26	362	3,216	362	3,216	0	0	0	0
6/27	1,023	4,239	1,023	4,239	0	0	0	0
6/28	566	4,805	566	4,805	0	0	0	0
6/29	956	5,761	956	5,761	0	0	0	0
6/30	2,375	8,136	2,375	8,136	0	0	0	0
7/ 1	1,442	9,578	1,442	9,578	0	0	0	0
7/ 2	2,289	11,867	2,289	11,867	0	0	0	0
7/ 3	2,156	14,023	2,156	14,023	0	0	0	0
7/ 4	2,512	16,535	2,512	16,535	0	0	0	0
7/ 5	1,942	18,477	1,942	18,477	0	0	0	0
7/ 6	1,687	20,164	1,687	20,164	0	0	0	0
7/ 7	1,611	21,775	1,611	21,775	0	0	0	0
7/ 8	4,796	26,571	4,796	26,571	0	0	0	0
7/ 9	5,145	31,716	5,145	31,716	0	0	0	0
7/10	6,333	38,049	6,333	38,049	0	0	0	0

-Continued-

Appendix Table 34. Total number of fish targets and estimated species composition recorded by side-scan sonar in the Crescent River, 15 June through 31 July 1984* (continued).

Date	Fish		Number of Fish					
	Targets	Cum	Sockeye	Cum	Chum	Cum	Coho	Cum
7/11	4,562	42,611	4,562	42,611	0	0	0	0
7/12	3,174	45,785	3,174	45,785	0	0	0	0
7/13	2,588	48,373	2,588	48,373	0	0	0	0
7/14	1,874	50,247	1,874	50,247	0	0	0	0
7/15	3,518	53,765	3,518	53,765	0	0	0	0
7/16	5,314	59,079	5,314	59,079	0	0	0	0
7/17	5,820	64,899	5,820	64,899	0	0	0	0
7/18	6,044	70,943	6,044	70,943	0	0	0	0
7/19	4,699	75,642	4,699	75,642	0	0	0	0
7/20	5,342	80,984	5,342	80,984	0	0	0	0
7/21	5,339	86,323	4,378	85,362	864	864	97	97
7/22	3,086	89,409	2,530	87,892	500	1,364	56	153
7/23	5,776	95,185	4,735	92,627	936	2,300	105	258
7/24	2,847	98,032	2,336	94,963	461	2,761	50	308
7/25	1,539	99,571	1,261	96,224	250	3,011	28	336
7/26	1,610	101,181	1,320	97,544	261	3,272	29	365
7/27	1,935	103,116	1,587	99,131	314	3,586	34	399
7/28	2,097	105,213	1,720	100,851	339	3,925	38	437
7/29	2,544	107,757	2,088	102,939	413	4,338	43	480
7/30	1,727	109,484	1,416	104,355	279	4,617	32	512
7/31	1,625	111,109	1,336	105,691	263	4,880	26	538
Total	111,109		105,691		4,880		538	
**			12,654	118,345				

* Sonar counts apportioned by hook and line catch. Round-off error estimated (worst case) +/- 1 fish per day.

** Sockeye salmon total includes 12,654 fish estimated to have entered the river after 7/31.

Appendix Table 35. Crescent River north bank side-scan sonar counts by sector, 17 June through 31 July 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
6 17	2	4	11	6	12	6	7	0	0	1	2	0	51	51
6 18	1	0	2	2	2	1	2	1	0	1	0	0	12	63
6 19	1	0	8	1	3	1	0	0	1	3	0	1	19	82
6 20	5	4	4	5	3	3	1	0	0	2	2	2	31	113
6 21	53	46	42	23	8	2	0	1	3	6	1	23	208	321
6 22	51	39	26	11	7	6	1	0	3	2	2	32	180	501
6 23	21	36	44	35	33	21	11	2	1	9	2	10	225	726
6 24	73	42	9	1	0	0	1	2	2	1	0	5	136	862
6 25	57	84	11	4	6	5	20	5	7	2	1	0	202	1064
6 26	48	16	32	35	7	4	6	2	1	0	2	6	159	1223
6 27	57	142	182	101	32	18	3	1	3	4	5	5	553	1776
6 28	61	54	59	15	3	3	0	0	1	3	1	2	202	1978
6 29	267	69	39	4	0	0	4	1	1	3	0	0	388	2366
6 30	167	363	573	176	36	23	11	8	1	0	0	2	1360	3726
7 1	10	61	365	215	75	43	13	11	1	0	1	3	798	4524
7 2	10	182	813	358	113	70	37	7	2	1	0	0	1593	6117
7 3	92	120	159	177	179	185	78	34	12	8	8	8	1060	7177
7 4	488	632	348	207	179	166	2	3	1	0	1	1	2028	9205
7 5	656	357	339	69	66	31	4	1	4	0	23	10	1560	10765
7 6	306	245	280	42	24	18	0	2	12	19	13	2	963	11728
7 7	368	92	30	7	7	4	11	1	5	1	2	3	531	12259
7 8	489	653	615	173	87	31	8	14	4	6	9	2	2091	14350
7 9	571	1231	883	290	77	33	11	8	5	2	0	4	3115	17465
7 10	117	981	2504	1269	380	144	30	12	3	4	2	0	5446	22911
7 11	151	1065	1524	701	306	97	39	23	9	9	7	1	3932	26843

-Continued-

-141-

Appendix Table 35. Crescent River north bank side-scan sonar counts by sector, 17 June through 31 July 1984 (continued).

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 12	69	766	954	286	178	150	75	17	8	4	4	0	2511	29354
7 13	15	179	604	487	321	198	65	17	2	4	1	1	1894	31248
7 14	122	361	298	113	89	101	55	15	5	3	3	4	1169	32417
7 15	136	529	901	410	322	249	67	27	15	19	4	3	2682	35099
7 16	414	1356	868	579	279	183	43	20	7	13	5	5	3772	38871
7 17	1054	1704	859	200	99	68	15	13	8	12	1	1	4034	42905
7 18	970	1582	1171	373	175	88	24	9	8	8	4	7	4419	47324
7 19	486	1406	1140	351	159	63	31	13	9	7	6	6	3677	51001
7 20	151	589	1609	903	441	207	80	24	13	9	5	8	4039	55040
7 21	960	1496	722	376	311	157	89	44	17	8	3	4	4187	59227
7 22	975	1065	225	88	70	23	12	10	5	4	2	1	2480	61707
7 23	1508	2218	623	149	95	46	15	7	3	1	1	4	4670	66377
7 24	1011	815	170	36	20	24	7	5	3	1	2	4	2098	68475
7 25	209	517	300	98	69	31	9	9	6	4	2	3	1257	69732
7 26	258	586	205	78	60	31	21	17	10	18	1	7	1292	71024
7 27	439	549	216	65	52	35	20	16	4	11	6	16	1429	72453
7 28	534	693	183	84	41	31	9	13	5	3	3	13	1612	74065
7 29	697	690	202	68	44	17	7	11	4	2	1	5	1748	75813
7 30	159	537	361	145	85	38	21	10	7	5	1	7	1376	77189
7 31	104	331	211	128	62	49	17	6	4	1	1	6	920	78109*
TOTAL	14393	24487	20724	8944	4617	2704	982	442	225	224	140	227	78109*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 36. Crescent River north bank side-scan sonar counts by sector, four day time periods, 17 June through 31 July 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
6 17-20	9	8	25	14	20	11	10	1	1	7	4	3	113	113
6 21-24	198	163	121	70	48	29	13	5	9	18	5	70	749	862
6 25-28	223	296	284	155	48	30	29	8	12	9	9	13	1116	1978
6 29- 2	454	675	1790	753	224	136	65	27	5	4	1	5	4139	6117
7 3- 6	1542	1354	1126	495	448	400	84	40	29	27	45	21	5611	11728
7 7-10	1545	2957	4032	1739	551	212	60	35	17	13	13	9	11183	22911
7 11-14	357	2371	3380	1587	894	546	234	72	24	20	15	6	9506	32417
7 15-18	2574	5171	3799	1562	875	588	149	69	38	52	14	16	14907	47324
7 19-22	2572	4556	3696	1718	981	450	212	91	44	28	16	19	14383	61707
7 23-26	2986	4136	1298	361	244	132	52	38	22	24	6	18	9317	71024
7 27-30	1829	2469	962	362	222	121	57	50	20	21	11	41	6165	77189
7 31-31	104	331	211	128	62	49	17	6	4	1	1	6	920	78109*
TOTAL	14393	24487	20724	8944	4617	2704	982	442	225	224	140	227	78109*	

*Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 37. Crescent River south bank side-scan sonar counts by sector, 15 June through 31 July 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
6 15	32	3	9	4	0	3	1	0	0	0	0	0	52	52
6 16	34	9	16	2	1	1	0	0	0	0	0	0	63	115
6 17	28	21	22	22	21	21	0	0	0	0	0	0	135	250
6 18	14	27	30	16	13	13	0	0	0	0	0	0	113	363
6 19	6	14	11	3	0	0	0	0	0	0	0	0	34	397
6 20	34	36	21	8	4	2	1	0	0	1	0	0	107	504
6 21	39	35	48	13	6	3	0	0	0	0	0	0	144	648
6 22	137	69	37	37	6	4	2	1	1	0	0	0	294	942
6 23	245	63	47	19	12	2	4	0	0	0	0	0	392	1334
6 24	167	91	20	4	0	0	1	0	0	0	0	0	283	1617
6 25	207	27	0	0	0	0	0	0	0	0	0	0	234	1851
6 26	164	29	5	2	0	1	0	0	0	0	0	0	201	2052
6 27	246	173	44	6	2	0	0	0	0	0	0	0	471	2523
6 28	220	104	31	8	0	1	1	0	0	0	0	0	365	2888
6 29	480	80	4	1	2	0	0	1	0	0	0	0	568	3456
6 30	520	292	122	28	19	13	7	8	0	2	0	0	1011	4467
7 1	220	268	113	25	4	3	8	1	0	2	0	0	644	5111
7 2	240	320	103	17	10	0	3	2	0	0	0	0	695	5806
7 3	71	147	103	26	17	15	0	0	0	0	0	0	379	6185
7 4	340	176	45	20	17	17	0	0	0	0	0	0	615	6800
7 5	273	87	16	1	6	1	0	0	0	0	0	0	384	7184
7 6	403	264	46	4	1	1	0	0	0	0	0	0	719	7903
7 7	533	354	106	29	10	9	0	0	0	0	0	0	1041	8944
7 8	1203	1075	321	78	23	5	0	0	0	0	0	0	2705	11649
7 9	916	851	219	27	8	7	1	0	0	1	0	0	2030	13679

-Continued-

Appendix Table 37. Crescent River south bank side-scan sonar counts by sector, 15 June through 31 July 1984 (continued).

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 10	387	419	106	20	4	1	1	0	0	0	0	0	938	14617
7 11	278	271	58	10	6	4	0	0	0	0	0	0	627	15244
7 12	207	345	92	14	4	1	0	0	0	0	0	0	663	15907
7 13	199	377	110	8	1	0	0	0	0	0	0	0	695	16602
7 14	103	340	222	37	8	0	1	0	0	0	0	0	711	17313
7 15	78	276	336	99	31	12	3	3	0	0	0	0	838	18151
7 16	177	623	492	160	63	28	8	2	1	1	1	1	1557	19708
7 17	670	846	191	44	16	14	1	0	0	0	0	0	1782	21490
7 18	725	747	134	17	2	0	0	0	0	0	0	0	1625	23115
7 19	400	483	122	16	0	1	0	0	0	0	0	0	1022	24137
7 20	248	557	411	73	11	2	1	0	0	0	0	0	1303	25440
7 21	310	402	344	82	8	4	1	1	0	0	0	0	1152	26592
7 22	284	233	80	7	1	1	0	0	0	0	0	0	606	27198
7 23	600	416	72	17	1	0	0	0	0	0	0	0	1106	28304
7 24	378	312	54	5	0	0	0	0	0	0	0	0	749	29053
7 25	100	103	62	14	1	0	0	2	0	0	0	0	282	29335
7 26	130	122	56	8	0	1	0	1	0	0	0	0	318	29653
7 27	225	235	42	4	0	0	0	0	0	0	0	0	506	30159
7 28	209	221	48	2	2	0	1	2	0	0	0	0	485	30644
7 29	348	377	66	4	0	1	0	0	0	0	0	0	796	31440
7 30	77	150	107	14	2	1	0	0	0	0	0	0	351	31791
7 31	285	312	93	13	2	0	0	0	0	0	0	0	705	32496*
	13190	12782	4837	1068	345	193	46	24	2	7	1	1	32496*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 38. Crescent River south bank side-scan sonar counts by sector, four day time periods, 15 June through 31 July 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
6 15-18	108	60	77	44	35	38	1	0	0	0	0	0	363	363
6 19-22	216	154	117	61	16	9	3	1	1	1	0	0	579	942
6 23-26	783	210	72	25	12	3	5	0	0	0	0	0	1110	2052
6 27-30	1466	649	201	43	23	14	8	9	0	2	0	0	2415	4467
7 1- 4	871	911	364	88	48	35	11	3	0	2	0	0	2333	6800
7 5- 8	2412	1780	489	112	40	16	0	0	0	0	0	0	4849	11649
7 9-12	1788	1886	475	71	22	13	2	0	0	1	0	0	4258	15907
7 13-16	557	1616	1160	304	103	40	12	5	1	1	1	1	3801	19708
7 17-20	2043	2633	858	150	29	17	2	0	0	0	0	0	5732	25440
7 21-24	1572	1363	550	111	10	5	1	1	0	0	0	0	3613	29053
7 25-28	664	681	208	28	3	1	1	5	0	0	0	0	1591	30644
7 29-31	710	839	266	31	4	2	0	0	0	0	0	0	1852	32496*
TOTAL	13190	12782	4837	1068	345	193	46	24	2	7	1	1	32496*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 39. Crescent River north bank side-scan sonar counts by hour, 17 June through 21 July 1984.

DATE	HOUR																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
6 17	1	0	0	1	1	3	0	1	0	9	0	1	1	1	11	0	8	7	2	2	0	2	0	0	
6 18	0	2	0	0	0	0	0	0	0	0	1	0	0	0	4	1	1	1	0	2	0	0	0	0	
6 19	0	0	0	0	0	0	4	6	0	0	0	0	1	0	0	1	1	0	0	1	1	1	1	2	
6 20	0	0	1	0	0	1	1	0	0	0	0	0	2	3	6	2	1	3	1	0	2	0	1	7	
6 21	5	11	3	14	14	3	5	3	3	0	1	3	3	7	24	15	6	25	29	19	8	6	0	1	
6 22	4	8	4	10	6	8	0	1	8	4	4	6	9	5	18	16	7	20	14	7	6	3	6	6	
6 23	11	2	12	2	4	8	0	3	2	1	2	5	6	22	15	23	27	24	21	23	7	3	1	1	
6 24	4	4	2	1	0	2	5	2	2	2	10	10	3	17	11	7	8	4	10	4	2	8	13	5	
6 25	15	7	32	19	17	4	8	3	7	4	2	6	7	13	2	8	6	13	3	6	5	4	9	2	
6 26	8	8	3	2	3	7	1	9	4	10	0	3	4	11	0	8	6	9	12	17	12	7	10	5	
6 27	1	9	6	1	3	2	10	4	3	9	10	7	15	32	44	24	48	56	99	72	38	24	25	11	
6 28	1	3	6	5	6	13	10	2	1	4	3	11	7	29	15	10	10	8	9	11	7	12	8	11	
6 29	13	9	12	28	16	20	30	42	17	8	7	4	7	8	12	6	11	10	14	31	20	17	29	17	
6 30	21	22	25	28	24	13	19	33	15	26	15	20	17	10	94	202	121	108	70	141	171	118	28	19	
7 1	6	2	0	4	5	12	9	4	20	20	28	42	54	69	60	72	57	34	24	13	113	98	31	21	
7 2	5	1	1	9	4	4	1	0	8	13	20	110	125	109	129	169	148	71	82	69	82	298	118	17	
7 3	10	5	2	6	2	7	0	1	10	16	43	105	105	142	23	24	13	78	78	78	78	78	78	78	
7 4	78	78	78	78	78	78	78	78	78	78	78	78	78	292	224	99	78	41	28	31	5	19	86	122	67
7 5	51	70	104	143	244	56	45	20	31	48	66	66	181	140	70	66	43	50	13	11	6	8	12	16	
7 6	30	14	17	31	29	43	25	7	25	16	51	38	74	122	136	85	36	47	43	25	15	10	32	12	
7 7	13	34	40	68	32	107	44	36	21	10	4	4	8	12	24	12	23	10	4	3	2	9	6	5	
7 8	6	4	11	10	18	6	11	4	5	9	10	136	156	176	235	318	288	243	227	103	57	37	20	1	
7 9	8	6	15	30	5	40	41	49	58	110	145	162	206	297	262	316	352	301	275	154	127	90	50	16	
7 10	11	4	13	39	112	124	21	50	136	131	222	320	384	367	197	234	595	717	937	410	247	140	24	11	
7 11	29	9	12	5	38	74	138	126	72	112	161	155	121	86	112	118	101	528	794	546	333	161	64	37	
7 12	8	8	16	12	6	62	34	31	58	69	53	49	52	44	57	18	26	121	739	565	262	141	51	29	
7 13	12	4	4	3	15	11	32	35	54	32	63	61	39	78	39	31	36	30	130	370	376	264	134	41	
7 14	21	25	13	50	32	27	41	44	79	54	12	30	26	19	27	41	19	18	18	105	84	186	128	70	
7 15	18	33	16	19	18	19	12	33	51	71	100	141	215	72	146	113	48	77	70	455	114	469	261	111	
7 16	49	20	18	25	16	19	13	24	165	188	181	122	91	66	108	118	41	32	54	726	1144	162	236	154	
7 17	48	50	45	19	23	18	25	50	208	310	232	257	221	280	209	133	115	94	106	113	431	476	400	171	
7 18	135	101	65	42	50	53	35	61	47	77	154	399	299	293	262	189	171	128	111	105	260	637	470	275	
7 19	148	106	77	99	57	30	41	24	61	88	250	360	357	264	186	157	157	135	103	71	65	241	372	228	
7 20	69	47	83	8	22	57	104	164	198	209	213	254	328	385	296	192	158	112	77	48	62	111	516	326	
7 21	226	83	25	25	35	46	50	81	167	107	27	111	195	219	555	451	295	191	147	64	116	189	373	409	
7 22	101	67	34	30	29	20	27	30	24	21	48	166	98	245	278	291	268	231	116	128	77	60	52	39	
7 23	28	50	39	55	42	37	42	115	87	297	458	393	239	123	281	628	448	467	333	217	139	91	35	26	
7 24	58	70	9	15	22	66	71	58	50	115	107	149	133	125	94	80	227	214	181	110	71	45	24	4	
7 25	10	7	17	28	34	63	20	29	23	18	41	72	51	66	98	35	106	145	154	104	71	33	20	12	
7 26	4	11	23	93	86	39	30	9	12	21	33	11	54	80	40	26	49	224	162	83	82	37	48	35	
7 27	24	20	14	46	29	24	26	22	27	26	51	58	61	38	48	54	23	308	254	151	55	43	13	14	
7 28	4	6	16	14	8	42	63	25	26	32	32	33	76	63	31	45	32	43	341	334	130	96	73	47	
7 29	30	14	4	5	3	30	67	129	87	83	25	49	90	109	82	69	52	38	161	243	172	104	75	27	
7 30	38	25	13	14	6	14	10	30	47	26	21	22	49	33	30	22	47	29	19	163	230	255	185	48	
7 31	28	18	25	14	12	9	11	11	11	24	50	35	37	28	33	15	22	23	18	58	176	132	82	48	

Appendix Table 40. Crescent River north bank side-scan sonar counts by hour, four day time periods, 17 June through 31 July 1984.

DATE	H O U R												CUMULATIVE	
	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	TOTAL	TOTAL
6 17-20	3	2	5	12	9	2	8	25	22	8	6	11	113	113
6 21-24	49	48	45	19	22	41	72	129	121	127	43	33	749	862
6 25-28	52	74	55	47	42	42	118	111	156	229	109	81	1116	1978
6 29- 2	79	107	98	138	127	246	399	744	560	444	917	280	4139	6117
7 3- 6	336	459	537	254	302	525	1280	581	336	284	300	417	5611	11728
7 7-10	86	226	444	256	480	1003	1606	1598	2529	2113	709	133	11183	22911
7 11-14	116	115	265	481	530	584	465	443	879	3267	1807	554	9506	32417
7 15-18	454	249	216	253	1117	1586	1537	1278	706	1740	3693	2078	14907	47324
7 19-22	847	381	296	521	875	1429	2091	2406	1547	754	921	2315	14383	61707
7 23-26	238	279	389	374	623	1264	871	1282	1880	1344	569	204	9317	71024
7 27-30	161	126	156	372	354	291	519	381	572	1666	1085	482	6165	77189
7 31-31	46	39	21	22	35	85	65	48	45	76	308	130	920	78109*
TOTAL	2467	2105	2527	2749	4516	7098	9031	9026	9353	12052	10467	6718	78109*	

*Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 41. Crescent River south bank side-scan sonar counts by hour, 15 June through 31 July 1984.

DATE	HOUR																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
6 15	1	3	0	0	0	4	3	1	2	0	1	0	0	2	1	3	2	5	5	6	6	1	0	6
6 16	0	5	2	2	3	3	5	1	3	2	2	3	1	1	2	4	4	4	9	1	3	3	0	0
6 17	5	4	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
6 18	6	6	6	6	6	6	6	6	6	2	4	4	6	7	4	3	0	6	5	4	8	2	1	3
6 19	2	3	2	0	0	0	0	0	1	0	0	0	1	5	2	6	0	1	4	5	2	0	0	0
6 20	8	7	2	1	0	1	0	0	2	0	6	1	6	9	12	7	5	11	6	2	8	0	2	11
6 21	7	2	0	2	0	1	0	4	0	0	3	6	5	17	12	11	16	18	12	10	4	7	2	5
6 22	4	9	20	14	12	22	7	5	8	11	8	14	16	13	19	23	15	20	10	15	8	15	3	3
6 23	19	20	34	34	22	29	27	33	1	3	11	19	11	18	22	20	20	18	10	4	13	3	1	0
6 24	0	4	5	4	2	0	2	1	6	9	7	19	26	30	14	12	13	24	18	29	17	37	2	2
6 25	73	2	4	3	11	3	7	4	6	5	2	7	6	4	6	5	10	24	6	3	7	10	17	9
6 26	12	13	14	6	11	12	7	7	5	1	2	6	4	7	0	3	7	6	15	15	16	12	12	8
6 27	13	9	19	8	9	12	8	6	2	3	0	13	12	13	28	47	28	43	113	41	24	7	12	1
6 28	0	0	0	0	0	2	0	0	4	7	16	7	31	19	14	10	10	25	35	67	45	37	15	21
6 29	21	34	17	25	17	20	17	42	43	33	13	44	46	14	22	7	12	18	21	21	31	23	14	13
6 30	19	13	19	15	22	3	17	30	18	22	45	26	70	91	138	108	34	26	42	130	69	32	15	7
7 1	4	2	3	0	0	0	4	6	8	18	23	30	38	49	25	16	45	26	14	7	142	82	95	7
7 2	1	8	35	12	4	2	0	0	3	5	11	51	104	79	45	82	54	40	19	13	9	74	42	2
7 3	0	2	4	5	1	1	0	4	2	2	9	23	58	43	36	12	15	9	18	18	18	57	24	18
7 4	8	3	1	5	2	4	1	24	24	24	17	24	36	20	52	7	11	6	4	4	28	56	163	91
7 5	16	28	3	7	5	1	9	5	10	17	14	38	76	38	34	13	7	4	1	4	5	23	8	18
7 6	16	7	3	2	2	7	5	6	5	9	20	55	74	60	123	119	70	48	30	20	18	8	4	8
7 7	3	12	6	2	0	3	3	11	4	13	10	48	65	132	143	182	166	89	57	27	32	21	10	2
7 8	4	3	9	1	9	16	25	35	49	98	138	144	199	278	218	260	359	310	223	141	104	52	20	10
7 9	7	16	57	122	104	41	37	21	45	91	65	97	118	102	81	86	207	189	212	101	114	54	38	25
7 10	5	20	36	91	75	41	23	32	37	60	59	27	26	21	12	16	70	105	62	32	49	23	11	5
7 11	17	7	7	12	10	28	14	14	27	19	35	21	33	22	16	24	6	59	89	92	28	20	14	13
7 12	4	11	31	17	12	29	15	18	35	16	24	22	29	20	37	10	3	24	84	84	40	56	25	17
7 13	15	16	10	8	3	19	36	11	6	39	34	37	27	23	13	18	10	19	22	81	141	73	17	17
7 14	25	14	7	23	14	22	44	17	14	19	28	12	14	23	33	23	11	20	5	110	140	49	30	14
7 15	21	38	11	14	14	11	1	12	6	1	7	17	82	24	43	33	16	16	12	15	214	135	68	27
7 16	76	67	53	42	12	14	22	11	71	61	74	31	57	46	54	32	72	10	7	115	268	153	95	114
7 17	162	48	30	20	23	9	17	1	159	371	72	40	74	112	72	44	28	38	15	22	79	123	168	55
7 18	26	16	19	6	17	22	12	22	9	56	88	117	119	108	122	77	50	69	25	13	64	218	214	136
7 19	27	29	33	54	37	19	13	14	4	24	49	102	108	88	67	33	49	24	12	14	9	48	78	87
7 20	35	48	53	29	4	10	6	3	18	34	34	81	204	124	95	78	68	36	22	19	9	5	121	167
7 21	107	27	21	20	10	4	12	14	5	23	17	57	100	66	114	115	61	60	36	4	8	29	75	167
7 22	58	10	24	7	9	11	4	5	11	6	5	8	27	23	65	84	75	59	30	26	9	12	26	12
7 23	10	40	67	14	13	11	14	13	20	72	153	77	29	18	36	41	122	84	87	75	52	32	19	7
7 24	17	5	12	9	31	33	53	16	31	46	54	30	65	51	38	16	45	59	54	45	7	15	12	5
7 25	9	13	11	15	15	7	7	6	3	6	3	20	12	18	15	7	13	30	28	6	3	10	8	17
7 26	6	20	20	20	15	2	7	2	1	2	5	0	6	11	7	8	0	32	45	18	25	14	30	22
7 27	29	10	6	16	9	10	7	2	4	10	7	13	24	18	27	14	11	89	93	35	28	24	8	12
7 28	3	9	2	6	13	17	10	16	13	9	6	3	12	14	5	14	8	28	133	67	31	23	19	24
7 29	15	2	5	1	8	10	52	40	9	26	8	15	50	48	45	16	36	17	79	124	90	52	29	19
7 30	19	12	9	5	0	2	10	0	6	6	8	16	13	12	5	5	8	9	7	45	61	38	31	24
7 31	18	2	3	9	1	0	1	3	0	8	18	41	35	36	47	17	17	17	32	47	189	101	32	31

Appendix Table 42. Crescent River south bank side-scan sonar counts by hour, four day time periods, 17 June through 31 July 1984.

DATE	H O U R												CUMULATIVE	
	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	TOTAL	TOTAL
6 15-18	30	22	34	34	27	26	29	29	33	42	35	22	363	363
6 19-22	42	41	36	16	22	38	72	92	86	64	44	26	579	942
6 23-26	143	104	90	88	36	73	106	82	122	100	115	51	1110	2052
6 27-30	109	103	85	120	132	164	296	374	196	470	268	98	2415	4467
7 1- 4	28	65	14	39	86	188	427	275	206	97	466	442	2333	6800
7 5- 8	89	33	43	99	205	467	922	1092	1053	503	263	80	4849	11649
7 9-12	87	373	340	174	330	350	371	282	663	756	384	148	4258	15907
7 13-16	272	168	109	154	217	240	296	249	174	367	1173	382	3801	19708
7 17-20	391	244	141	88	675	583	937	588	362	142	555	1026	5732	25440
7 21-24	274	174	122	131	214	401	379	509	565	357	164	323	3613	29053
7 25-28	99	96	88	57	48	57	115	97	211	425	158	140	1591	30644
7 29-31	68	32	21	106	55	106	194	135	104	334	531	166	1852	32496*
TOTAL	1632	1455	1123	1106	2047	2693	4144	3804	3775	3657	4156	2904	32496*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 43. Total number of fish targets and estimated species composition recorded by north bank sonar in the Crescent River, 15 June through 31 July 1984*.

Date	Fish Targets	Cum	Number of Fish					
			Sockeye	Cum	Chum	Cum	Coho	Cum
6/15	0	0	0	0	0	0	0	0
6/16	0	0	0	0	0	0	0	0
6/17	55	55	55	55	0	0	0	0
6/18	12	67	12	67	0	0	0	0
6/19	19	86	19	86	0	0	0	0
6/20	31	117	31	117	0	0	0	0
6/21	209	326	209	326	0	0	0	0
6/22	192	518	192	518	0	0	0	0
6/23	227	745	227	745	0	0	0	0
6/24	134	879	134	879	0	0	0	0
6/25	210	1,089	210	1,089	0	0	0	0
6/26	161	1,250	161	1,250	0	0	0	0
6/27	552	1,802	552	1,802	0	0	0	0
6/28	202	2,004	202	2,004	0	0	0	0
6/29	388	2,392	388	2,392	0	0	0	0
6/30	1,365	3,757	1,365	3,757	0	0	0	0
7/ 1	798	4,555	798	4,555	0	0	0	0
7/ 2	1,594	6,149	1,594	6,149	0	0	0	0
7/ 3	1,785	7,934	1,785	7,934	0	0	0	0
7/ 4	1,910	9,844	1,910	9,844	0	0	0	0
7/ 5	1,558	11,402	1,558	11,402	0	0	0	0
7/ 6	968	12,370	968	12,370	0	0	0	0
7/ 7	528	12,898	528	12,898	0	0	0	0
7/ 8	2,091	14,989	2,091	14,989	0	0	0	0
7/ 9	3,115	18,104	3,115	18,104	0	0	0	0
7/10	5,395	23,499	5,395	23,499	0	0	0	0

-Continued-

Appendix Table 43. Total number of fish targets and estimated species composition recorded by north bank sonar in the Crescent River, 15 June through 31 July 1984* (cont.).

Date	Fish Targets	Cum	Number of Fish					
			Sockeye	Cum	Chum	Cum	Coho	Cum
7/11	3,931	27,430	3,931	27,430	0	0	0	0
7/12	2,511	29,941	2,511	29,941	0	0	0	0
7/13	1,893	31,834	1,893	31,834	0	0	0	0
7/14	1,163	32,997	1,163	32,997	0	0	0	0
7/15	2,679	35,676	2,679	35,676	0	0	0	0
7/16	3,765	39,441	3,765	39,441	0	0	0	0
7/17	4,036	43,477	4,036	43,477	0	0	0	0
7/18	4,419	47,896	4,419	47,896	0	0	0	0
7/19	3,677	51,573	3,677	51,573	0	0	0	0
7/20	4,039	55,612	4,039	55,612	0	0	0	0
7/21	4,187	59,799	3,426	59,038	676	676	85	85
7/22	2,480	62,279	2,029	61,067	401	1,077	50	135
7/23	4,670	66,949	3,821	64,888	755	1,832	94	229
7/24	2,098	69,047	1,717	66,605	339	2,171	42	271
7/25	1,257	70,304	1,028	67,633	204	2,375	25	296
7/26	1,292	71,596	1,057	68,690	209	2,584	26	322
7/27	1,429	73,025	1,169	69,859	231	2,815	29	351
7/28	1,612	74,637	1,319	71,178	260	3,075	33	384
7/29	1,748	76,385	1,430	72,608	283	3,358	35	419
7/30	1,376	77,761	1,126	73,734	222	3,580	28	447
7/31	920	78,681	753	74,487	148	3,728	19	466
Total	78,681		74,487		3,728		466	

* Sonar counts apportioned by hook and line catch. Round-off error estimated (worst case) +/- 1 fish per day.

Appendix Table 44. Total number of fish targets and estimated species composition recorded by south bank sonar in the Crescent River, 15 June through 31 July 1984*.

Date	Fish		-----Number of Fish-----					
	Targets	Cum	Sockeye	Cum	Chum	Cum	Coho	Cum
6/15	52	52	52	52	0	0	0	0
6/16	67	119	67	119	0	0	0	0
6/17	72	191	72	191	0	0	0	0
6/18	92	283	92	283	0	0	0	0
6/19	34	317	34	317	0	0	0	0
6/20	105	422	105	422	0	0	0	0
6/21	144	566	144	566	0	0	0	0
6/22	294	860	294	860	0	0	0	0
6/23	392	1,252	392	1,252	0	0	0	0
6/24	283	1,535	283	1,535	0	0	0	0
6/25	230	1,765	230	1,765	0	0	0	0
6/26	201	1,966	201	1,966	0	0	0	0
6/27	471	2,437	471	2,437	0	0	0	0
6/28	364	2,801	364	2,801	0	0	0	0
6/29	568	3,369	568	3,369	0	0	0	0
6/30	1,010	4,379	1,010	4,379	0	0	0	0
7/ 1	644	5,023	644	5,023	0	0	0	0
7/ 2	695	5,718	695	5,718	0	0	0	0
7/ 3	371	6,089	371	6,089	0	0	0	0
7/ 4	602	6,691	602	6,691	0	0	0	0
7/ 5	384	7,075	384	7,075	0	0	0	0
7/ 6	719	7,794	719	7,794	0	0	0	0
7/ 7	1,083	8,877	1,083	8,877	0	0	0	0
7/ 8	2,705	11,582	2,705	11,582	0	0	0	0
7/ 9	2,030	13,612	2,030	13,612	0	0	0	0
7/10	938	14,550	938	14,550	0	0	0	0

-Continued-

Appendix Table 44. Total number of fish targets and estimated species composition recorded by south bank sonar in the Crescent River, 15 June through 31 July 1984* (continued).

Date	Fish Targets	Cum	Number of Fish					
			Sockeye	Cum	Chum	Cum	Coho	Cum
7/11	631	15,181	631	15,181	0	0	0	0
7/12	663	15,844	663	15,844	0	0	0	0
7/13	695	16,539	695	16,539	0	0	0	0
7/14	711	17,250	711	17,250	0	0	0	0
7/15	839	18,089	839	18,089	0	0	0	0
7/16	1,549	19,638	1,549	19,638	0	0	0	0
7/17	1,784	21,422	1,784	21,422	0	0	0	0
7/18	1,625	23,047	1,625	23,047	0	0	0	0
7/19	1,022	24,069	1,022	24,069	0	0	0	0
7/20	1,303	25,372	1,303	25,372	0	0	0	0
7/21	1,152	26,524	952	26,324	188	188	12	12
7/22	606	27,130	501	26,825	99	287	6	18
7/23	1,106	28,236	914	27,739	181	468	11	29
7/24	749	28,985	619	28,358	122	590	8	37
7/25	282	29,267	233	28,591	46	636	3	40
7/26	318	29,585	263	28,854	52	688	3	43
7/27	506	30,091	418	29,272	83	771	5	48
7/28	485	30,576	401	29,673	79	850	5	53
7/29	796	31,372	658	30,331	130	980	8	61
7/30	351	31,723	290	30,621	57	1,037	4	65
7/31	705	32,428	583	31,204	115	1,152	7	72
Total	32,428		31,204		1,152		72	

* Sonar counts apportioned by hook and line catch. Round-off error estimated (worst case) +/- 1 fish per day.

Appendix Table 45. Length composition of the major age classes of sockeye salmon collected in the Crescent River, 1979-1984.

Year	Age Class	Male			Female			Total			Ratio Male-Female
		Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	
1979	1.2	509	6.2	92	523	4.5	86	516	3.9	178	1.1:1
1980		459	12.4	17	494	13.5	4	466	---	21	4.3:1
1981		472	6.3	47	471	7.2	31	472	---	78	1.5:1
1982		522	8.6	59	491	8.6	33	511	8.6	92	1.8:1
1983		467	6.1	47	487	6.5	25	474	4.6	72	1.9:1
1984		476	9.4	17	502	9.4	10	485	6.9	27	1.7:1
1979	1.3	585	3.0	184	572	1.2	274	578	1.4	458	0.7:1
1980		568	2.1	167	549	1.5	223	557	---	390	0.7:1
1981		576	2.5	121	555	2.6	172	564	---	293	0.7:1
1982		586	1.4	303	556	1.4	259	572	1.4	562	1.2:1
1983		570	2.1	111	542	1.8	169	553	1.3	280	0.7:1
1984		574	4.7	60	552	2.4	72	562	2.5	132	0.8:1

-Continued-

Appendix Table 45. Length composition of the major age classes of sockeye salmon collected in the Crescent River, 1979-1984 (continued).

Year	Age Class	Male			Female			Total			Ratio Male-Female
		Average Length (mm) ^{1/}	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	
1980	2.2	497	10.0	9	493	6.3	9	495	---	18	1.0:1
1981		487	55.0	40	519	4.5	57	506	---	97	0.7:1
1983		494	3.9	93	488	3.0	89	491	2.5	182	1.0:1
1984		499	4.2	81	507	3.7	75	503	2.8	156	1.1:1
1980	2.3	556	7.9	30	546	3.2	36	551	---	66	0.8:1
1981		584	2.0	158	554	1.6	237	566	---	395	0.7:1
1982		592	4.3	22	555	3.3	28	571	3.8	50	0.8:1
1983		569	3.5	43	550	2.1	80	556	1.8	123	0.5:1
1984		581	1.5	261	553	1.6	202	569	1.1	463	1.3:1

^{1/} Lengths measured mid-eye to fork of tail.

Appendix Table 46. Weight composition of the major age classes of sockeye salmon collected in the Crescent River, 1980-1984.

Year	Age Class	Male			Female			Total		
		Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size
1981	1.2	2.0	0.10	47	1.8	0.09	31	2.0	---	78
1982		2.7	0.15	59	2.0	0.11	33	2.5	0.13	92
1983		1.8	0.08	47	2.0	0.09	25	1.9	0.06	72
1984		2.0	0.16	17	2.4	0.23	10	2.2	0.13	27
1980	1.3	3.1	0.07	59	2.7	0.04	91	2.9	---	150
1981		3.5	0.05	121	2.9	0.04	172	3.2	---	293
1982		3.7	0.03	303	2.9	0.02	258	3.3	0.03	561
1983		3.3	0.04	111	2.7	0.03	169	2.9	0.02	280
1984		3.5	0.09	60	2.8	0.04	72	3.1	0.04	132
1981	2.2	2.4	0.13	40	2.5	0.07	57	2.4	---	97
1983		2.3	0.06	93	2.0	0.03	89	2.1	0.04	182
1984		2.3	0.07	81	2.2	0.06	75	2.2	0.05	156

-Continued-

Appendix Table 46. Weight composition of the major age classes of sockeye salmon collected in the Crescent River, 1980-1984 (continued).

Year	Age Class	Male			Female			Total		
		Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size
1980	2.3	3.1	0.15	27	2.6	0.05	32	2.9	---	59
1981		3.7	0.04	158	2.9	0.03	237	3.2	---	395
1982		3.9	0.12	22	2.9	0.06	28	3.3	0.09	50
1983		3.2	0.06	43	2.8	0.03	80	2.9	0.03	123
1984		3.7	0.03	261	2.8	0.03	202	3.3	0.02	463

Appendix Table 47. Daily hook and release catch and seine catch from Crescent River, 21 July through 31 July 1984.

Date	Hook and Release				Seine	
	Sockeye	Chum	Coho	Chinook	Sockeye	Chum
7/21	20	3				
7/22	35	8	1	1		
7/23	49					
7/24	26	3				
7/25	6	3				
7/26	4		1		194	
7/27	2	2			194	
7/28					270	
7/29					68	
7/30	7	1			93	1
7/31	4					
Total	153	20	2	1	819	1

Appendix Table 48. Total number of fish targets and estimated species composition recorded by side-scan sonar on the east bank of the Susitna River at Susitna Station, 1 July through 8 August 1984*.

Date	Fish Targets		Number of Fish									
		Cum	Sockeye	Cum	Pink	Cum	Chum	Cum	Coho	Cum	Chinook	Cum
7/ 1	138	138	96	96	13	13	10	10	11	11	8	8
7/ 2	137	275	95	191	13	26	10	20	11	22	8	16
7/ 3	103	378	72	263	9	35	8	28	8	30	6	22
7/ 4	174	552	121	384	16	51	13	41	13	43	11	33
7/ 5	125	677	87	471	11	62	10	51	9	52	8	41
7/ 6	175	852	122	593	16	78	13	64	13	65	11	52
7/ 7	121	973	84	677	11	89	9	73	10	75	7	59
7/ 8	155	1,128	108	785	14	103	12	85	12	87	9	68
7/ 9	976	2,104	678	1,463	89	192	75	160	74	161	60	128
7/10	741	2,845	515	1,978	68	260	56	216	57	218	45	173
7/11	195	3,040	135	2,113	18	278	15	231	15	233	12	185
7/12	237	3,277	165	2,278	21	299	18	249	19	252	14	199
7/13	279	3,556	194	2,472	25	324	22	271	21	273	17	216
7/14	215	3,771	149	2,621	20	344	16	287	17	290	13	229
7/15	238	4,009	165	2,786	22	366	18	305	18	308	15	244
7/16	1,993	6,002	1,384	4,170	183	549	152	457	152	460	122	366
7/17	10,425	16,427	7,242	11,412	955	1,504	796	1,253	795	1,255	637	1,003
7/18	11,244	27,671	5,256	16,668	3,662	5,166	1,551	2,804	603	1,858	172	1,175
7/19	15,938	43,609	7,450	24,118	5,190	10,356	2,199	5,003	855	2,713	244	1,419
7/20	17,803	61,412	3,625	27,743	11,922	22,278	1,370	6,373	886	3,599	0	1,419
7/21	17,084	78,496	1,472	29,215	14,972	37,250	384	6,757	256	3,855	0	1,419
7/22	21,960	100,456	2,004	31,219	18,823	56,073	784	7,541	349	4,204	0	1,419
7/23	21,953	122,409	1,839	33,058	18,749	74,822	831	8,372	534	4,738	0	1,419
7/24	23,237	145,646	1,621	34,679	19,905	94,727	1,261	9,633	450	5,188	0	1,419
7/25	16,196	161,842	842	35,521	14,215	108,942	990	10,623	149	5,337	0	1,419
7/26	18,082	179,924	828	36,349	16,551	125,493	413	11,036	290	5,627	0	1,419

-Continued-

Appendix Table 48. Total number of fish targets and estimated species composition recorded by side-scan sonar on the east bank of the Susitna River at Susitna Station, 1 July through 8 August 1984* (continued).

Date	Fish		Number of Fish									
	Targets	Cum	Sockeye	Cum	Pink	Cum	Chum	Cum	Coho	Cum	Chinook	Cum
7/27	12,822	192,746	419	36,768	11,946	137,439	153	11,189	266	5,893	38	1,457
7/28	36,816	229,562	1,334	38,102	33,881	171,320	534	11,723	1,067	6,960	0	1,457
7/29	67,528	297,090	1,008	39,110	63,328	234,648	2,856	14,579	336	7,296	0	1,457
7/30	55,868	352,958	1,552	40,662	51,928	286,576	1,194	15,773	1,194	8,490	0	1,457
7/31	44,126	397,084	1,120	41,782	36,958	323,534	3,808	19,581	2,240	10,730	0	1,457
8/ 1	21,824	418,908	776	42,558	17,598	341,132	2,587	22,168	863	11,593	0	1,457
8/ 2	13,478	432,386	479	43,037	10,868	352,000	1,598	23,766	533	12,126	0	1,457
8/ 3	9,492	441,878	447	43,484	8,150	360,150	647	24,413	248	12,374	0	1,457
8/ 4	7,865	449,743	371	43,855	6,753	366,903	535	24,948	206	12,580	0	1,457
8/ 5	4,419	454,162	384	44,239	3,234	370,137	545	25,493	256	12,836	0	1,457
8/ 6	3,764	457,926	327	44,566	2,755	372,892	464	25,957	218	13,054	0	1,457
8/ 7	3,072	460,998	267	44,833	2,248	375,140	379	26,336	178	13,232	0	1,457
8/ 8	3,123	464,121	272	45,105	2,285	377,425	385	26,721	181	13,413	0	1,457
Total	464,121		45,105		377,425		26,721		13,413		1,457	

* Sonar counts apportioned by fishwheel catch. Round-off error estimated (worst case) +/-1 fish per day.

Appendix Table 49. Total number of fish targets and estimated species composition recorded by side scan sonar in the Yentna River at Yentna Station, 1 July through 5 September 1984.

Date Mo Day	Fish Targets	Number of Fish											
		Chinook	Cum	Sockeye	Cum	Pink	Cum	Chum	Cum	Coho	Cum	Misc.	Cum
7/01	156	4	4	82	82	20	20	25	25	5	5	20	20
7/02	243	6	10	139	221	29	49	35	60	7	12	27	47
7/03	188	5	15	127	348	17	66	20	80	5	17	14	61
7/04	210	6	21	157	505	15	81	17	97	4	21	11	72
7/05	129	3	24	92	597	10	91	13	110	2	23	9	81
7/06	86	2	26	61	653	7	98	8	118	2	25	6	87
7/07	77	3	29	61	719	4	102	5	123	1	26	3	90
7/08	53	2	31	33	757	4	106	5	128	1	27	3	93
7/09	198	5	36	124	881	20	126	25	153	5	32	19	112
7/10	353	9	45	237	1,118	32	158	39	192	8	40	28	140
7/11	316	4	49	214	1,332	28	186	35	227	8	48	27	167
7/12	359	6	55	238	1,570	33	219	41	268	9	57	32	199
7/13	356	5	60	246	1,816	30	249	38	306	8	65	29	228
7/14	521	6	66	379	2,195	39	288	49	355	11	76	37	265
7/15	487	7	73	337	2,532	41	329	52	407	11	87	39	304
7/16	1,272	17	90	885	3,417	106	435	133	540	29	116	102	406
7/17	19,747	113	203	17,819	21,236	499	934	701	1,241	188	304	427	833
7/18	16,871	27	230	13,351	34,587	2,168	3,102	1,169	2,410	146	450	10	843
7/19	24,046	13	243	16,874	51,461	5,575	8,677	1,367	3,777	204	654	13	856
7/20	34,468	0	243	16,921	68,382	16,127	24,804	1,207	4,984	213	867	0	856
7/21	37,469	0	243	14,380	82,762	21,626	46,430	983	5,967	480	1,347	0	856
7/22	35,803	87	330	10,772	93,534	23,682	70,112	670	6,637	592	1,939	0	856
7/23	41,947	0	330	8,218	101,752	32,047	102,159	796	7,433	829	2,768	57	913
7/24	45,394	39	369	11,077	112,829	32,503	134,662	759	8,192	948	3,716	68	981
7/25	26,041	0	369	4,400	117,229	20,323	154,985	611	8,303	630	4,396	27	1,008
7/26	21,595	0	369	3,453	120,682	17,274	172,259	457	9,260	411	4,807	0	1,008
7/27	21,039	21	390	4,147	124,829	16,098	188,357	328	9,588	355	5,162	90	1,098
7/28	28,790	0	390	2,870	127,699	24,961	213,318	322	9,910	597	5,759	40	1,138
7/29	36,163	0	390	1,625	129,324	33,773	247,091	361	10,271	409	6,168	0	1,138
7/30	23,546	0	390	1,180	130,504	21,695	268,786	498	10,769	173	6,341	0	1,138

-Continued-

-162-

Appendix Table 49. Total number of fish targets and estimated species composition recorded by side scan sonar in the Yentna River at Yentna Station, 1 July through 5 September 1984 (continued).

Date Mo Day	Fish Targets	Number of Fish											
		Chinook	Cum	Sockeye	Cum	Pink	Cum	Chum	Cum	Coho	Cum	Misc.	Cum
7/31	23,448	0	390	1,715	132,219	20,786	289,572	711	11,430	236	6,577	0	1,138
8/01	22,637	0	390	1,203	133,422	19,677	309,249	1,261	12,741	457	7,034	39	1,177
8/02	15,736	0	390	1,133	134,555	13,267	322,516	950	13,691	361	7,395	25	1,202
8/03	14,030	0	390	1,269	135,824	10,788	333,304	1,174	14,865	799	8,194	0	1,202
8/04	11,644	0	390	1,611	137,435	8,428	341,732	837	15,702	761	8,955	7	1,209
8/05	9,030	0	390	950	138,385	6,456	348,188	743	16,445	369	9,824	12	1,221
8/06	6,726	0	390	1,153	139,538	4,691	352,879	567	17,012	315	10,139	0	1,221
8/07	3,914	0	390	671	140,209	2,511	355,390	504	17,516	228	10,367	0	1,221
8/08	4,536	0	390	871	141,080	2,493	357,883	534	18,050	638	11,005	0	1,221
8/09	3,964	0	390	628	141,708	2,168	360,051	639	18,689	529	11,534	0	1,221
8/10	4,537	0	390	734	142,442	2,462	362,513	721	19,410	620	12,154	0	1,221
8/11	3,630	0	390	721	143,163	1,492	364,005	553	19,963	852	13,006	12	1,233
8/12	2,304	0	390	481	143,644	916	364,921	340	20,303	561	13,567	6	1,239
8/13	2,473	0	390	473	144,117	948	365,869	361	20,664	623	14,195	63	1,302
8/14	1,838	0	390	454	144,571	604	366,473	191	20,855	522	14,717	67	1,369
8/15	1,380	0	390	340	144,911	456	366,929	144	20,999	390	15,107	50	1,419
8/16	1,157	0	390	401	145,312	313	367,242	142	21,141	257	15,364	44	1,463
8/17	1,219	0	390	391	145,703	368	367,610	147	21,288	267	15,631	46	1,509
8/18	908	0	390	304	146,007	259	367,869	110	21,398	200	15,831	35	1,544
8/19	692	0	390	242	146,249	185	368,054	85	21,483	154	15,985	26	1,570
8/20	231	0	390	107	146,356	29	368,083	30	21,513	55	16,040	10	1,580
8/21	339	0	390	164	146,520	34	368,117	45	21,558	81	16,121	15	1,595
8/22	1,167	0	390	444	146,964	266	368,383	146	21,704	264	16,385	47	1,642
8/23	1,529	0	390	428	147,392	157	368,540	419	22,123	278	16,663	247	1,889
8/24	1,270	0	390	398	147,790	130	368,670	318	22,441	243	16,906	181	2,070
8/25	1,282	0	390	386	148,176	131	368,801	332	22,773	241	17,147	192	2,262
8/26	1,264	0	390	319	148,495	129	368,930	371	23,144	220	17,367	225	2,487
8/27	1,562	0	390	208	148,703	88	369,018	759	23,903	179	17,546	328	2,815
8/28	838	0	390	134	148,837	36	369,054	416	24,319	97	17,643	155	2,970
8/29	1,179	0	390	175	149,012	58	369,112	580	24,899	135	17,778	231	3,201

-Continued-

Appendix Table 49. Total number of fish targets and estimated species composition reported by side scan sonar in the Yentna River at Yentna Station, 1 July through 5 September 1984 (continued).

Date Mo Day	Fish Targets	Number of Fish											
		Chinook	Cum	Sockeye	Cum	Pink	Cum	Chum	Cum	Coho	Cum	Misc.	Cum
8/30	1,202	0	390	141	149,153	77	369,189	577	25,476	137	17,915	270	3,471
8/31	921	0	390	139	149,292	44	369,233	455	25,931	105	18,020	178	3,649
9/01	560	0	390	74	149,366	32	369,265	272	26,203	64	18,084	118	3,767
9/02	208	0	390	2	149,368	8	369,273	83	26,286	25	18,109	90	3,857
9/03	225	0	390	3	149,371	11	369,284	92	26,378	26	18,135	93	3,950
9/04	253	0	390	3	149,374	12	369,296	103	26,481	30	18,165	105	4,055
9/05	64	0	390	1	149,375	3	369,299	27	26,508	7	18,172	26	4,081
Total		390		149,375		369,299		26,508		18,172		4,081	

Appendix Table 50. Apportioned sonar counts and Peterson population (tag-recapture) estimates by species and sampling location, Adult Anadromous Investigations, Susitna Hydroelectric Studies, 1984.^{1/}

Location	River Mile	Estimate Type	Escapement Estimate				
			Sockeye	Pink	Chum	Coho	Chinook
Flathorn Station	22	Tag/Recap	605,833	3,629,857	812,694	190,061	
Yentna Station		Sonar	149,375	369,299	26,508	18,172	---
Sunshine Station	80	Tag/Recap	130,071	1,017,022	764,958	94,702	117,128
Talkeetna Station	103	Tag/Recap	13,050	177,881	98,236	11,847	24,591
Curry Station	120	Tag/Recap	3,593	116,858	49,278	2,162	17,351

^{1/} Source, Barrett et al. 1985.

Appendix Table 51. Daily fishwheel catch by species on the east bank of the Susitna River at Susitna Station, 1 July through 8 August 1984 1/2/.

Date	Number Wheels	Hours Open	Sockeye	Pink	Chum	Coho	Chinook	Other
7/01	2	24	8	2				2
7/02	2	48	1	1				4
7/03	2	46		1				1
7/04	2	48	1	1				1
7/05	2	48	1				1	6
7/06	2	47	3				3	6
7/07	2	48	3				1	3
7/08	2	47	1					
7/09	2	48	2		3		1	
7/10	2	39	10					1
7/11	2	36	2			4		3
7/12	2	48	2		2			
7/13	2	48						
7/14	2	48	1					1
7/15	2	44	3	2		1		2
7/16	2	48	2	1				2
7/17	2	48	50	4	5	4		3
7/18	2	45	48	8	12	9	1	4
7/19	2	48	74	77	24	5	3	
7/20	2	48	45	148	17	11		
7/21	2	48	23	234	6	4		
7/22	2	48	23	216	9	4		
7/23	2	48	31	316	14	9		2
7/24	2	48	18	221	14	5		
7/25	2	48	17	287	20	3		2
7/26	2	48	20	400	10	7		
7/27	2	48	11	314	4	7	1	
7/28	2	24	10	254	4	8		
7/29	2	44	6	377	17	2		
7/30	2	46	13	435	10	10		
7/31	2	48	5	165	17	10		
8/01	2	48	7	107	17	4		
8/02	2	48	2	97	13	6		
8/03	2	48	8	101	9	1		
8/04	2	48	1	63	4	4		

-Continued-

Appendix Table 51. Daily fishwheel catch by species on the east bank of the Susitna River at Susitna Station, 1 July through 8 August 1984 1/2/ (continued).

Date	Number Wheels	Hours Open	Sockeye	Pink	Chum	Coho	Chinook	Other
8/05	2	46	8	60	4	4		
8/06	2	45	2	25	7			
8/07	2	48		5	2			
8/08	2	48	2	11	4	4		
Total			464	3,933	248	126	11	43

- 1/ Fishwheel catch adjusted for 24 hours: $\frac{\text{daily catch} \times 24 \text{ hours}}{\text{hours open}}$
- 2/ Actual catch: sockeye - 456; pink - 3,722; chum - 240; coho - 121; chinook - 13; other - 43.
- 3/ Other species include rainbow trout, round whitefish, humpbacked whitefish, longnosed sucker.

Appendix Table 52. Susitna River (Susitna Station) east bank side-scan sonar counts by sector, 1 July through 8 August 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 1	12	10	9	3	3	0	12	16	14	20	20	18	137	137
7 2	38	11	5	0	3	2	8	13	6	9	11	21	127	264
7 3	24	15	15	0	4	2	7	11	3	6	6	6	99	363
7 4	40	24	9	7	9	4	9	16	9	18	15	17	177	540
7 5	29	23	6	3	1	1	6	10	5	12	15	11	122	662
7 6	22	18	10	4	6	1	9	22	13	22	20	23	170	832
7 7	14	15	10	6	4	4	8	6	7	10	13	13	110	942
7 8	33	29	12	7	1	1	6	7	9	16	20	21	162	1104
7 9	51	23	10	17	13	5	32	51	54	71	79	107	513	1617
7 10	30	25	20	14	11	10	32	46	43	47	56	63	397	2014
7 11	40	27	8	4	3	4	9	13	12	32	26	21	199	2213
7 12	57	23	16	12	9	0	5	9	11	21	36	38	237	2450
7 13	78	22	29	8	5	7	17	11	13	29	39	22	280	2730
7 14	38	25	14	7	4	4	11	9	23	23	37	27	222	2952
7 15	57	28	17	3	3	1	11	8	16	35	35	27	241	3193
7 16	76	40	34	35	24	27	40	62	91	127	138	148	842	4035
7 17	238	79	197	124	233	163	415	518	803	793	805	1153	5521	9556
7 18	169	93	207	132	307	216	559	666	885	868	1022	1417	6541	16097
7 19	200	175	526	381	466	324	859	985	1190	1187	1246	1886	9425	25522
7 20	535	287	538	281	421	270	986	1179	1495	1612	1591	1823	11018	36540
7 21	568	452	705	449	410	263	1049	1203	1544	1560	1638	2116	11957	48497
7 22	793	642	1343	788	639	379	1215	1220	1643	1614	1773	2220	14269	62766
7 23	728	483	909	503	478	334	1070	1151	1612	1643	1700	2343	12954	75720
7 24	631	540	973	534	454	329	937	1100	1397	1602	1791	2255	12543	88263
7 25	449	361	994	534	468	203	966	1042	1320	1421	1734	2007	11499	99762

-Continued-

Appendix Table 52. Susitna River (Susitna Station) east bank side-scan sonar counts by sector, 1 July through 8 August 1984 (continued).

DATE	SECTOR												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 26	988	842	2477	1103	482	173	679	661	905	898	958	1224	11390	111152
7 27	2522	2639	3834	1093	232	30	192	160	121	263	371	220	11677	122829
7 28	5688	3831	5476	2308	1031	483	1630	1866	1239	1811	1908	2191	29462	152291
7 29	585	1653	3898	3554	2125	853	4455	5322	3355	4272	4362	4247	38681	190972
7 30	401	1822	3985	3298	2177	1140	5016	6355	3844	4485	4963	5048	42534	233506
7 31	221	1805	3446	2317	1559	827	3556	4591	3057	3322	3711	3363	31775	265281
8 1	314	771	1366	1142	773	413	2044	2370	1575	2361	2195	1926	17250	282531
8 2	486	620	791	680	309	189	1001	1061	774	1449	1166	1175	9701	292232
8 3	532	438	398	272	157	104	552	578	627	1034	941	1107	6740	298972
8 4	547	407	436	314	139	80	461	432	553	789	871	789	5818	304790
8 5	531	474	451	344	126	51	332	305	390	530	461	424	4419	309209
8 6	673	499	429	227	122	67	180	147	181	266	283	238	3312	312521
8 7	657	413	346	146	46	9	127	88	89	170	183	153	2427	314948
8 8	603	457	328	124	46	9	114	71	74	182	141	193	2342	317290*
TOTAL	19698	20141	34277	20778	13303	6982	28617	33381	29002	34630	36380	40101	317290*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 53. Susitna River (Susitna Station) east bank side-scan sonar counts by sector, four day time periods, 1 July through 8 August 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 1- 4	114	60	38	10	19	8	36	56	32	53	52	62	540	540
7 5- 8	98	85	38	20	12	7	29	45	34	60	68	68	564	1104
7 9-12	178	98	54	47	36	19	78	119	120	171	197	229	1346	2450
7 13-16	249	115	94	53	36	39	79	90	143	214	249	224	1585	4035
7 17-20	1142	634	1468	918	1427	973	2819	3348	4373	4460	4664	6279	32505	36540
7 21-24	2720	2117	3930	2274	1981	1305	4271	4674	6196	6419	6902	8934	51723	88263
7 25-28	9647	7673	12781	5038	2213	889	3467	3729	3585	4393	4971	5642	64028	152291
7 29- 1	1521	6051	12695	10311	6634	3233	15071	18638	11831	14440	15231	14584	130240	282531
8 2- 5	2096	1939	2076	1610	731	424	2346	2376	2344	3802	3439	3495	26678	309209
8 6- 8	1933	1369	1103	497	214	85	421	306	344	618	607	584	8081	317290*
TOTAL	19698	20141	34277	20778	13303	6982	28617	33381	29002	34630	36380	40101	317290*	

*Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 54. Fish target observations inside and outside of the 18 m counting range of the Bendix side-scanning sonar in the Susitna River, 9 July through 8 August 1984.

Date	Time		Total	Total Fish Targets	
	Start	End		0-18 m	18-24 m
7/09	0940	1000	20	4	5
	1315	1335	20	15	6
	1810	1830	20	7	16
	2220	2240	20	5	3
7/16	1915	1930	15	10	19
	2030	2055	25	45	45
7/17	0740	0755	15	45	45
	1410	1430	20	49	39
	1830	1855	25	61	56
7/18	1115	1130	15	61	58
	1640	1700	20	90	61
	2215	2230	15	85	45
7/19	0728	0743	15	54	49
	1550	1600	10	39	31
	2340	2352	12	94	64
7/20	0735	0755	20	107	83
	1400	1500	60	545	311
	1500	1600	60	453	214
	1600	1700	60	444	260
	1700	1800	60	340	266
7/21	1100	1200	60	545	299
	1200	1300	60	664	306
	1500	1600	60	673	229
	1700	1800	60	765	302
7/22	1000	1100	60	391	294
	1100	1200	60	604	405
	1400	1500	60	956	392
	1500	1600	60	793	377
7/23	1030	1130	60	145	177
	1130	1230	60	381	195
	1400	1500	60	474	362
	1500	1600	60	596	367
7/24	1000	1100	60	167	189
	1100	1200	60	406	348
	1400	1500	60	724	447
	1500	1600	60	370	441

-Continued-

Appendix Table 54. Fish target observations inside and outside of the 18 m counting range of the Bendix side-scanning sonar in the Susitna River, 9 July through 8 August 1984 (continued).

Date	Time		Total	Total Fish Targets	
	Start	End		0-18 m	18-24 m
7/25	1605	1610	5	42	14
	2005	2015	10	48	23
7/26	1210	1215	5	22	13
7/27	1155	1200	5	22	0
	2145	2150	5	35	6
7/28	1020	1025	5	57	3
	2115	2120	5	26	9
7/29	0915	0920	5	25	22
	2050	2055	5	27	18
	2150	2200	10	52	40
7/30	1150	1155	5	28	6
	1900	1905	5	31	13
7/31	1430	1435	5	26	10
8/01	1840	1845	5	31	8
8/02	2200	2210	10	23	10
8/03	1100	1110	10	20	13
	1440	1445	5	28	7
8/04	1000	1015	15	23	7
	1530	1545	15	15	6
	1910	1925	15	16	6
8/05	0800	0810	10	12	4
	1430	1445	15	10	6
	1910	1920	10	11	5
8/06	0800	0810	10	6	1
	1600	1610	10	9	2
	2240	2250	10	6	0
8/07	0800	0810	10	14	2
	2030	2040	10	12	5
8/08	0800	0810	10	7	2
	1920	1930	10	5	2

Appendix Table 55. Susitna River (Susitna Station) east bank side-scan sonar counts by hour, 1 July through 8 August 1984.

DATE	HOUR																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
7 1	6	3	8	9	13	5	6	11	6	3	3	1	3	6	5	1	6	6	6	6	6	6	6	6
7 2	5	7	7	5	5	9	5	6	1	4	0	11	1	9	3	4	6	6	10	2	5	2	9	5
7 3	5	8	7	0	11	2	0	6	0	1	7	3	2	5	5	3	3	7	2	3	8	3	2	6
7 4	2	6	3	7	4	9	9	1	8	10	16	6	11	12	11	10	3	8	10	5	4	7	5	10
7 5	1	2	8	4	10	6	4	5	6	3	6	0	3	5	8	8	5	7	6	6	4	8	6	1
7 6	7	3	7	4	7	10	5	11	4	14	4	7	9	6	4	5	3	8	4	11	7	14	11	5
7 7	6	6	3	5	3	4	7	5	0	8	0	5	6	7	2	2	3	9	1	4	4	7	5	8
7 8	14	3	3	5	9	2	8	7	6	8	7	9	6	3	7	4	11	9	7	6	9	4	4	11
7 9	21	23	23	17	22	25	28	30	18	24	12	18	30	24	10	27	20	16	24	18	20	13	24	26
7 10	18	22	26	17	14	20	29	25	11	7	9	18	18	12	10	5	18	18	18	18	18	18	17	11
7 11	11	7	14	11	22	11	14	5	6	9	12	5	3	0	5	4	5	2	6	10	10	3	4	20
7 12	10	5	13	8	5	9	2	7	28	4	6	7	8	9	9	1	12	5	10	15	15	23	15	11
7 13	12	21	14	11	24	14	17	16	11	5	11	7	19	8	10	12	12	5	7	9	7	6	9	13
7 14	30	18	2	16	3	1	12	3	12	12	8	2	8	7	4	10	24	9	2	5	0	8	6	20
7 15	6	4	3	6	3	8	14	4	6	23	3	16	6	9	10	1	18	22	12	12	10	23	5	17
7 16	14	17	19	21	16	11	25	16	13	13	7	36	19	5	26	31	14	18	38	36	36	171	108	132
7 17	226	208	225	299	382	439	345	282	300	217	216	208	109	178	228	231	170	183	228	164	189	223	148	123
7 18	215	186	171	161	150	221	190	270	306	316	306	276	248	360	378	342	276	340	325	271	357	241	276	359
7 19	339	337	411	414	392	390	375	284	396	364	396	188	296	355	373	163	228	396	437	498	390	368	1059	576
7 20	532	600	608	412	517	501	635	351	381	367	238	327	366	353	456	456	456	456	362	393	459	479	661	652
7 21	638	591	560	566	579	571	603	392	354	519	303	498	498	514	483	498	498	467	479	484	460	516	391	495
7 22	553	557	660	561	711	659	647	544	591	547	594	594	717	594	594	594	550	651	627	568	628	315	538	675
7 23	634	771	662	664	757	613	606	499	445	437	540	540	540	388	540	540	566	330	404	460	400	488	701	429
7 24	753	706	838	648	741	706	520	513	457	452	522	522	574	661	522	522	522	301	158	298	290	251	398	668
7 25	651	530	471	420	377	348	347	275	323	288	253	218	372	494	631	692	720	715	698	513	477	417	611	658
7 26	659	681	710	831	565	454	467	480	501	432	277	257	298	485	371	500	499	544	633	526	336	337	230	317
7 27	399	414	483	460	515	573	577	549	374	428	332	350	336	359	307	374	601	436	626	573	495	749	674	693
7 28	1049	1215	1141	1269	1484	1149	996	1761	1744	1798	1306	1312	1230	1230	876	1010	1059	1274	971	1113	1043	1084	1151	1197
7 29	1242	1197	1314	1437	1643	1827	1465	1777	1688	1667	1610	1424	1673	1539	1721	1568	1712	1822	1865	1818	1796	1445	1729	1702
7 30	1592	1683	1668	1723	1853	1638	1840	1676	1800	1864	1618	1525	1980	1506	1697	1846	1846	2046	2184	1938	1865	1529	1948	1669
7 31	1933	1734	1793	1565	1332	1420	1182	1217	1469	1335	1213	1479	1051	1388	1349	1169	1184	1221	1197	1198	1235	1094	1098	919
8 1	909	646	800	762	674	617	776	608	745	800	720	622	703	731	775	748	806	828	764	692	724	591	627	582
8 2	538	476	451	542	473	449	429	425	456	338	363	341	388	365	356	355	359	402	531	534	330	257	218	325
8 3	254	265	205	230	274	343	398	371	289	281	140	182	260	255	238	282	216	307	247	308	339	323	384	349
8 4	266	287	302	238	254	323	239	326	319	307	206	206	236	216	154	203	192	223	194	191	249	264	220	203
8 5	189	241	229	237	182	209	176	196	166	170	154	196	272	210	188	195	154	175	149	160	135	110	142	184
8 6	153	181	147	197	119	160	138	138	121	155	178	123	144	152	159	151	157	115	110	79	88	112	120	115
8 7	123	116	90	82	79	87	94	95	101	70	75	64	91	90	89	134	82	116	162	130	143	112	106	96
8 8	129	117	133	146	120	118	120	110	141	86	128	99	112	102	61	53	60	61	66	68	62	64	90	96

Appendix Table 56. Susitna River (Susitna Station) east bank side-scan sonar counts by hour, four day time periods, 1 July through 8 August 1984.

DATE	H O U R												CUMULATIVE	
	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	TOTAL	TOTAL
7 1- 4	42	46	58	44	33	47	49	42	45	44	41	49	540	540
7 5- 8	42	39	51	52	49	38	45	40	55	45	57	51	564	1104
7 9-12	117	129	128	140	107	87	104	71	96	119	120	128	1346	2450
7 13-16	122	92	80	107	95	90	81	104	122	121	261	310	1585	4035
7 17-20	2643	2701	2992	2732	2647	2155	2265	2627	2505	2678	2706	3854	32505	36540
7 21-24	5203	5159	5337	4324	3802	4113	4486	4293	3885	3478	3348	4295	51723	88263
7 25-28	5598	5785	5465	5452	5888	4305	4804	4761	5848	5653	4938	5531	64028	152291
7 29- 1	10936	11062	11004	10541	11368	10211	10571	10873	11465	11656	10279	10274	130240	282531
8 2- 5	2516	2434	2507	2560	2326	1788	2202	1971	2028	2314	2007	2025	26678	309209
8 6- 8	819	795	683	695	674	667	691	647	591	615	581	623	8081	317290*
TOTAL	28038	28242	28305	26647	26989	23501	25298	25429	26640	26723	24338	27140	317290*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 57. Yentna River (Yentna Station) north bank side-scan sonar counts by hour, 1 July through 4 September 1984.

DATE	HOUR																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
7 1	0	0	0	0	0	0	0	0	0	0	0	3	8	16	10	15	16	10	2	19	9	8	2	5
7 2	3	1	2	1	13	4	11	11	1	8	3	5	8	1	0	10	5	1	12	7	13	0	0	2
7 3	3	7	1	1	3	8	1	1	7	3	0	5	7	2	2	1	6	3	3	0	2	4	8	1
7 4	11	2	10	5	2	0	5	0	2	7	0	0	7	4	0	0	1	0	0	8	1	3	7	1
7 5	3	5	2	0	1	3	1	1	6	0	4	1	5	3	4	4	0	1	2	3	4	7	3	0
7 6	11	0	1	0	1	0	2	0	6	1	1	1	3	2	0	0	0	1	0	0	2	3	5	1
7 7	0	3	4	0	1	0	2	0	1	1	1	1	3	4	2	1	0	0	0	0	0	1	0	0
7 8	0	0	1	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	3	2	1	5	5
7 9	9	7	6	11	4	6	9	11	8	9	11	1	2	42	8	10	30	12	2	4	2	1	1	6
7 10	8	6	8	12	11	15	6	31	8	8	9	9	5	15	4	1	2	11	3	17	17	20	35	4
7 11	5	8	10	6	4	28	5	5	3	14	12	15	9	6	0	3	11	1	10	14	1	2	1	18
7 12	2	4	3	2	8	5	2	5	2	3	7	12	16	7	9	4	26	11	27	10	19	2	8	3
7 13	9	6	4	3	17	14	6	17	5	4	7	7	8	2	6	15	18	2	7	8	3	3	3	6
7 14	3	4	5	2	11	5	6	10	12	10	2	3	10	2	5	9	15	21	9	3	12	19	12	9
7 15	12	9	6	6	7	6	1	13	8	10	21	12	4	7	23	14	15	3	13	14	15	20	5	16
7 16	22	16	24	33	23	27	32	53	55	9	4	43	31	67	44	16	32	52	31	28	31	38	27	49
7 17	70	82	79	62	89	58	61	42	67	138	42	52	102	93	94	70	121	163	156	81	118	155	159	105
7 18	70	131	192	150	135	117	176	225	114	118	164	94	93	111	157	198	151	76	167	184	174	169	242	335
7 19	180	180	180	180	180	180	180	180	180	105	123	137	180	180	180	186	220	352	217	244	86	230	144	297
7 20	301	388	384	372	373	275	209	292	208	202	150	326	231	404	384	320	318	250	311	294	249	304	210	242
7 21	329	371	402	362	283	328	277	254	232	229	168	223	189	253	197	134	237	168	271	152	140	200	198	107
7 22	189	213	283	221	167	209	181	236	107	95	176	136	142	134	128	140	171	247	450	356	189	369	447	311
7 23	452	285	398	462	412	331	224	271	460	344	371	354	432	456	853	361	510	623	480	441	619	697	529	573
7 24	1066	1144	836	652	604	684	715	767	728	634	723	513	296	529	429	505	699	658	551	577	477	526	403	345
7 25	305	456	350	357	274	230	221	229	223	240	141	160	296	217	283	275	284	384	525	440	451	263	574	312
7 26	240	240	240	240	240	240	240	135	256	132	224	352	298	114	253	314	293	234	293	220	249	135	280	135
7 27	200	130	225	258	241	154	174	259	164	179	254	129	177	214	134	88	116	92	108	272	214	175	202	318
7 28	213	257	199	243	187	203	219	205	144	163	358	186	284	200	227	308	191	286	186	265	470	220	346	583
7 29	286	442	362	240	399	238	247	330	219	254	267	184	252	228	189	524	342	374	199	206	434	221	257	248
7 30	231	364	396	374	315	300	290	291	365	283	267	341	475	374	267	406	212	253	303	244	277	301	272	589
7 31	275	330	212	309	208	301	422	289	238	269	397	265	229	261	193	251	219	321	325	338	336	279	609	334
8 1	365	309	281	308	332	404	300	174	314	418	346	338	278	415	534	377	333	283	297	364	307	328	462	311
8 2	315	395	361	240	231	199	277	166	237	279	387	136	151	238	216	222	211	183	122	125	148	137	384	195
8 3	148	232	178	201	171	100	117	205	145	243	149	142	277	175	112	164	90	119	112	126	137	219	184	181
8 4	163	132	135	216	93	125	86	150	117	101	116	105	100	103	128	83	158	110	74	102	76	78	68	223
8 5	161	101	108	134	137	143	101	174	111	103	86	106	240	121	139	115	126	165	115	81	55	54	64	75
8 6	53	48	76	79	65	50	53	109	65	62	63	64	87	66	51	36	35	42	44	35	61	33	53	56
8 7	77	75	74	97	92	31	36	37	46	43	19	46	24	15	45	39	55	109	64	41	75	53	64	86
8 8	76	95	101	92	42	85	102	77	118	64	39	36	121	29	82	88	71	25	115	61	65	83	85	73
8 9	52	43	75	59	77	45	116	67	40	92	105	106	47	79	42	45	29	26	124	62	39	85	102	105
8 10	83	86	110	65	88	103	37	82	67	115	70	50	92	75	70	50	72	74	70	67	68	82	38	59
8 11	68	77	66	99	98	75	69	32	26	38	48	58	72	42	33	33	28	70	68	67	68	44	32	16
8 12	19	24	11	31	26	17	60	23	18	31	48	11	22	17	69	32	24	38	19	30	39	25	41	48
8 13	64	69	39	70	47	49	51	46	24	64	68	52	117	46	31	26	31	35	34	53	28	24	35	33
8 14	29	34	33	53	39	36	41	45	35	37	78	49	47	24	17	71	12	17	13	20	58	18	10	24
8 15	20	40	33	20	20	39	38	34	35	22	87	25	24	18	13	18	31	6	35	29	18	2	19	19
8 16	29	17	17	28	27	21	20	68	25	55	29	40	35	22	22	12	17	12	17	14	19	16	9	15
8 17	46	12	34	16	48	33	53	30	45	49	10	10	31	42	45	37	18	13	16	22	29	30	55	49
8 18	23	12	24	18	22	27	36	38	13	46	6	7	6	9	22	3	44	3	35	37	37	8	9	12
8 19	5	8	6	9	10	11	6	24	4	6	10	11	8	7	13	31	10	21	35	32	18	25	26	12
8 20	0	0	0	0	0	0	0	0	3	0	3	1	0	0	0	0	0	0	0	0	0	4	0	0
8 21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 22	11	8	0	3	7	7	20	0	35	4	5	12	12	12	12	12	19	53	8	21	20	25	75	
8 23	30	68	20	47	29	39	42	19	28	14	4	24	23	11	10	21	30	41	31	44	58	11	13	33
8 24	46	46	7	56	37	24	42	30	3	9	9	13	8	3	15	9	12	12	8	24	15	16	14	15
8 25	11	10	37	24	15	1	1	24	47	9	24	12	20	29	19	11	24	14	28	36	32	23	27	23
8 26	6	13	11	22	16	13	50	8	7	33	15	33	36	35	15	29	24	52	32	39	56	22	46	40
8 27	46	48	20	31	8	52	26	8	26	16	55	23	11	23	13	1	18	18	18	18	18	18	18	18
8 28	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	13	14	28	14	33	5	6	6	18
8 29	2	3	3	8	3	19	14	15	3	18	31	11	1	1	1	24	19	36	15	54	12	19	28	32
8 30	58	57	16	23	36	51	21	46	37	55	50	119	9	10	62	0	1	0	1	0	6	1	1	1
8 31	16	12	2	1	2	1	0	45	3	6	37	43	7	9	6	4	4	0	10	15	11	24	5	9
9 1	20	26	4	0	4	14	6	4	9	5	8	20	11	3	4	2	2	22	5	13	9	3	25	1
9 2	7	21	2	3	0	0	0	0	1	0	1	3	3	4	5	5	1	0	6	0	2	3	2	1
9 3	5	1	0	2	1	0	1	1	0	0	21	0	1	0	25	27	9	1	2	0	2	6	0	1
9 4	3	6	1	3	6	18	7	0	1	4	0	12	8	17	0	1	3	1	1	3	3	1	1	12

Appendix table 58. Yentna River (Yentna Station) north bank side-scan sonar counts by hour, six day time periods, 1 July through 4 September 1984.

DATE	H O U R												CUMULATIVE	
	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	TOTAL	TOTAL
7 1- 6	46	23	35	33	41	23	66	46	44	56	56	35	504	504
7 7-12	52	63	82	77	57	78	112	42	104	90	68	86	911	1415
7 13-18	434	566	509	642	550	451	530	651	669	701	757	968	7428	8843
7 19-24	5098	4732	4026	3786	3524	3400	3426	3817	4453	4344	4086	3806	48498	57341
7 25-30	3364	3484	3021	2840	2622	2863	3129	3268	3061	3261	3410	3816	38139	95480
7 31- 5	2926	2683	2444	2461	2575	2573	2588	2534	2318	2181	2154	3090	30527	126007
8 6-11	833	993	851	817	776	704	749	614	636	818	756	769	9316	135323
8 12-17	403	385	402	509	440	507	445	393	254	302	306	357	4703	140026
8 18-23	165	127	152	185	153	83	88	124	180	275	202	205	1939	141965
8 24-29	243	231	200	230	183	238	179	164	271	310	243	306	2798	144763
8 30- 4	232	57	133	131	121	314	82	141	44	56	76	59	1446	146209*
TOTAL	13796	13344	11855	11711	11042	11234	11394	11794	12034	12394	12114	13497	146209*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 59. Yentna River (Yentna Station) south bank side-scan sonar counts by hour, 1 July through 4 September 1984.

DATE	HOUR																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
7 1	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	5	4	3	0	0	0	0	0	0
7 2	3	0	2	1	1	0	3	6	1	5	6	3	5	2	1	0	4	2	0	0	5	2	0	0
7 3	1	4	3	1	1	2	4	2	1	1	2	5	7	1	12	8	30	5	12	12	24	14	4	5
7 4	11	4	17	8	9	4	0	11	4	1	2	6	12	2	1	6	0	1	6	1	8	3	2	4
7 5	7	3	5	2	1	7	2	1	3	1	0	2	4	8	1	6	2	2	5	2	1	0	3	0
7 6	0	4	0	1	1	1	4	2	3	0	4	1	1	6	1	1	2	1	0	3	1	2	1	4
7 7	0	2	7	0	0	5	0	1	0	7	0	2	0	0	2	3	5	8	1	0	0	3	2	4
7 8	0	0	1	5	1	4	0	0	0	0	1	0	3	0	0	0	3	1	2	1	2	2	0	3
7 9	0	1	0	2	0	1	0	5	0	2	3	1	7	5	1	3	4	2	2	3	7	2	6	6
7 10	4	10	7	9	10	4	4	10	1	2	8	22	1	8	0	0	3	11	2	7	6	13	5	4
7 11	9	11	5	1	6	3	5	3	2	6	5	7	0	0	6	17	5	28	5	20	0	5	9	6
7 12	7	0	2	0	1	0	4	12	2	8	8	5	1	10	9	4	10	15	2	13	2	4	12	5
7 13	3	1	9	10	7	0	6	5	0	4	2	4	7	6	5	7	9	2	12	6	15	7	8	4
7 14	12	4	3	4	16	20	10	22	13	7	2	12	18	22	12	15	7	10	14	8	2	12	20	8
7 15	16	3	13	9	1	3	1	5	4	3	6	6	9	11	9	11	13	4	11	9	2	13	16	12
7 16	12	8	8	6	5	13	8	14	20	11	13	11	8	19	10	7	7	18	22	22	20	28	43	141
7 17	208	314	385	483	646	683	739	686	1045	774	868	770	792	1205	1010	811	860	873	809	687	851	606	652	22
7 18	59	93	87	96	91	86	84	72	73	95	458	384	446	481	478	630	1003	888	1019	827	700	622	366	366
7 19	233	867	1058	1031	1013	882	787	806	603	649	598	949	704	812	709	832	894	965	814	961	884	808	800	893
7 20	907	1234	1175	1252	1254	1095	1018	1136	1243	835	971	929	773	624	1132	952	1086	1526	872	853	1044	1081	929	1593
7 21	1188	1228	831	880	868	1614	1592	1462	1445	1420	1474	1363	1037	1337	838	981	1464	1430	1313	989	1153	1176	1439	1335
7 22	1259	1356	1331	1478	1429	1669	1582	1571	1676	1218	888	1028	1020	1421	1059	1412	1196	1091	1280	1231	1047	1182	775	1307
7 23	1035	1087	1148	1253	1451	1726	1818	1371	1628	1166	1250	1290	1332	1418	1199	1207	1333	1348	1139	1201	1102	1205	1106	1088
7 24	1012	1111	1223	1324	1401	1682	1778	1656	1473	1337	1046	1525	1359	1671	1223	1289	1079	1212	1031	1148	823	892	1199	840
7 25	1088	1083	1159	1393	1195	1234	1134	1032	872	722	683	578	513	586	605	518	506	680	772	549	438	353	322	535
7 26	628	774	868	852	548	732	717	771	697	598	944	644	697	392	448	545	544	682	537	738	582	766	626	751
7 27	736	785	1092	907	886	741	739	817	619	370	210	713	675	762	468	307	559	755	620	633	745	745	883	795
7 28	833	1045	1197	1221	1052	955	1033	975	787	923	680	639	743	955	718	937	788	1235	925	614	1182	931	989	1291
7 29	1771	1994	1891	1803	1644	1748	1624	1355	1385	1348	1104	991	1052	722	1098	1309	1151	1089	1054	972	508	575	750	678
7 30	799	754	927	876	840	769	752	732	834	770	634	520	671	389	819	426	597	647	747	388	376	606	811	623
7 31	674	922	878	725	811	754	747	646	750	578	424	309	368	390	678	678	678	678	678	731	690	914	839	757
8 1	1062	1100	975	905	704	604	699	791	631	539	647	555	731	449	388	543	279	588	512	460	388	394	300	406
8 2	456	380	407	326	270	364	363	405	350	446	458	292	346	532	479	315	487	558	551	570	470	512	426	460
8 3	402	338	380	368	456	425	472	382	495	482	415	223	513	429	500	557	537	390	416	356	206	458	534	424
8 4	404	483	554	633	390	491	543	419	430	366	385	152	244	314	309	327	410	332	330	250	139	177	393	332
8 5	334	471	405	434	399	380	297	367	296	349	236	62	205	211	108	206	82	208	239	271	165	155	134	201
8 6	233	370	325	286	330	347	299	337	212	179	222	69	222	222	222	222	222	222	222	222	222	56	31	42
8 7	44	36	34	26	41	66	89	138	152	134	178	102	102	138	125	111	114	131	109	132	114	145	143	164
8 8	202	175	117	134	93	109	98	100	97	97	103	90	143	60	105	122	105	110	99	107	79	126	118	125
8 9	129	114	95	122	91	100	135	65	82	73	95	80	105	74	89	133	82	64	87	106	127	103	88	62
8 10	112	103	142	87	78	91	71	98	83	102	89	100	107	44	77	62	120	114	160	171	234	142	142	226
8 11	167	134	112	115	87	54	80	96	76	101	86	112	124	63	102	152	148	130	90	103	30	48	34	53
8 12	74	71	50	51	89	47	66	29	70	46	62	66	78	77	96	87	60	70	73	100	72	61	45	56
8 13	75	66	45	62	56	57	38	58	43	72	40	56	91	35	28	72	100	49	57	50	62	70	24	28
8 14	38	28	27	42	49	38	57	32	44	42	35	56	39	62	41	33	51	46	86	22	29	22	32	18
8 15	20	22	39	35	22	18	47	24	41	23	30	77	12	61	36	20	41	41	23	25	20	11	25	23
8 16	33	15	15	36	28	27	22	29	15	30	24	25	35	33	23	31	21	25	102	14	34	16	0	16
8 17	16	18	18	34	10	15	33	13	26	34	8	24	8	21	25	15	18	19	28	17	23	25	7	34
8 18	16	17	15	6	14	9	19	18	29	9	27	32	13	9	15	14	17	27	13	22	7	13	20	27
8 19	50	30	30	24	53	9	9	9	5	8	7	13	9	10	11	16	12	7	10	10	3	6	4	2
8 20	0	5	0	4	1	2	3	5	3	1	1	1	0	6	1	5	42	6	8	31	15	34	24	13
8 21	14	34	6	4	12	8	17	10	22	10	11	11	4	10	0	26	48	9	12	9	19	15	16	11
8 22	25	13	19	31	24	30	6	25	26	21	34	10	35	23	47	25	30	40	27	60	73	48	38	14
8 23	38	18	15	19	34	27	20	21	46	25	38	36	63	27	58	42	41	42	36	42	26	58	38	23
8 24	28	25	24	21	15	14	33	31	36	17	46	53	65	46	43	47	30	31	46	26	18	50	24	24
8 25	22	28	25	6	13	24	29	39	43	32	24	35	44	44	41	49	37	29	35	25	33	31	29	28
8 26	31	21	8	6	34	16	14	18	9	11	16	47	49	48	21	47	22	39	16	36	31	18	33	29
8 27	25	33	23	20	16	33	29	34	26	25	17	27	73	84	47	60	73	34	36	35	21	55	70	39
8 28	40	13	14	35	27	17	4	54	18	13	68	28	19	18	5	25	27	20	26	41	8	49	31	35
8 29	62	16	17	39	25	9	13	36	36	21	54	31	56	48	63	46	36	41	17	21	22	54	53	31
8 30	42	50	24	31	19	11	8	26	25	45	44	25	23	47	26	22	11	15	23	14	30	16	20	16
8 31	23	42	8	24	25	29	28	31	21	17	47	20	51	27	25	23	27	43	17	22	10	35	43	15
9 1	35	30	24	24	20	16	4	20	9	7	4	18	2	18	8	9	16	6	5	16	27	8	10	3
9 2	1	1	11	0	0	7	0	9	11	1	3	0	4	6	7	2	8	24	2	1	10	15	10	
9 3	4	0	0	1	8	1	7	5	2	9	10	3	10	6	4	5	2	7	3	4	12			

Appendix Table 60. Yentna River (Yentna Station) south bank side-scan sonar counts by hour, six day time periods, 1 July through 4 September 1984.

DATE	H O U R												CUMULATIVE	
	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	TOTAL	TOTAL
7 1- 6	37	40	27	35	20	34	51	42	56	41	60	26	469	469
7 7-12	44	39	35	44	30	62	35	45	95	58	46	62	595	1064
7 13-18	733	1113	1571	1652	2049	2536	3024	3005	3694	3446	2878	1658	27359	28423
7 19-24	12597	13984	16084	16577	14693	13311	13508	12833	14624	12832	12397	12870	166310	194733
7 25-30	12290	14186	12344	11681	9925	8340	8157	8198	9233	8549	7807	9054	119764	314497
7 31- 5	7026	6990	6048	6131	5712	4158	4732	5088	5227	5364	4668	5206	66350	380847
8 6-11	1819	1595	1487	1606	1388	1326	1404	1522	1562	1608	1426	1228	17971	398818
8 12-17	476	454	456	448	486	503	552	507	541	597	445	308	5773	404591
8 18-23	260	173	223	162	205	221	209	260	321	280	317	230	2861	407452
8 24-29	344	238	243	334	287	446	594	494	419	360	390	426	4575	412027
8 30- 4	232	157	140	144	159	186	210	144	155	146	168	136	1977	414004*
TOTAL	35858	38969	38658	38814	34954	31123	32476	32138	35927	33281	30602	31204	414004*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 61. Yentna River (Yentna Station) north bank side-scan sonar counts by sector, 1 July through 8 September 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 1	90	2	2	0	0	0	0	0	0	8	16	5	123	123
7 2	62	7	0	1	0	0	0	2	0	2	11	37	122	245
7 3	36	13	0	0	0	0	1	0	1	11	13	4	79	324
7 4	36	0	2	0	0	0	0	0	9	8	17	4	76	400
7 5	42	0	0	0	0	0	0	0	1	2	10	8	63	463
7 6	25	2	0	0	0	0	0	0	0	0	3	11	41	504
7 7	17	1	0	0	0	0	0	0	0	1	1	5	25	529
7 8	17	2	0	0	0	0	0	0	0	0	0	2	21	550
7 9	99	11	2	1	1	1	1	2	1	2	18	73	212	762
7 10	140	23	3	2	0	0	1	1	3	4	11	77	265	1027
7 11	131	9	12	2	0	0	0	0	1	13	8	15	191	1218
7 12	119	20	3	0	0	0	0	2	1	6	23	23	197	1415
7 13	96	34	5	0	0	0	1	1	1	4	19	19	180	1595
7 14	115	28	4	1	0	0	1	1	0	3	36	10	199	1794
7 15	88	57	13	1	0	0	2	6	4	14	31	44	260	2054
7 16	521	83	23	6	2	0	11	9	17	29	28	58	787	2841
7 17	753	181	146	85	27	7	101	113	156	240	217	233	2259	5100
7 18	1188	209	182	85	31	4	98	192	278	466	427	583	3743	8843
7 19	255	193	215	123	104	90	389	402	446	766	845	673	4501	13344
7 20	500	293	362	173	62	34	328	454	749	1341	1336	1365	6997	20341
7 21	852	366	367	172	47	9	202	337	588	838	1106	820	5704	26045
7 22	277	414	278	97	27	8	149	181	343	993	1322	1208	5297	31342
7 23	319	692	368	99	32	13	342	448	589	1790	3017	3229	10938	42280
7 24	293	669	693	338	126	46	831	805	835	1938	3375	5112	15061	57341
7 25	247	638	757	346	92	33	365	379	442	1052	1377	1762	7490	64831

-Continued-

Appendix Table 61. Yentna River (Yentna Station) north bank side-scan sonar counts by sector, 1 July through 8 September 1984 (continued).

DATE	SECTOR												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 26	667	365	377	218	115	100	383	404	428	803	879	858	5597	70428
7 27	1326	333	367	262	35	28	213	149	113	255	488	908	4477	74905
7 28	684	172	251	215	73	24	325	302	240	712	1400	1745	6143	81048
7 29	1364	448	621	300	99	24	342	308	241	478	967	1750	6942	87990
7 30	998	528	651	291	101	27	348	346	313	644	1461	1782	7490	95480
7 31	1565	637	764	377	169	33	326	350	308	633	804	1244	7210	102690
8 1	691	465	529	376	236	89	347	362	357	909	1527	2290	8178	110868
8 2	679	187	358	157	69	21	230	295	273	609	962	1715	5555	116423
8 3	472	326	267	108	52	16	189	192	177	504	713	911	3927	120350
8 4	350	227	173	89	21	7	126	152	124	302	489	782	2842	123192
8 5	823	135	139	80	23	3	95	84	66	231	539	597	2815	126007
8 6	775	287	157	43	14	1	12	9	3	25	28	32	1386	127393
8 7	822	200	125	49	7	0	16	15	1	9	19	80	1343	128736
8 8	1053	316	221	86	10	0	34	15	3	16	29	42	1825	130561
8 9	925	245	227	82	9	3	41	22	8	15	39	46	1662	132223
8 10	978	223	141	71	23	3	69	38	23	37	63	104	1773	133996
8 11	571	229	216	64	16	4	39	32	37	40	21	58	1327	135323
8 12	199	149	118	36	10	1	32	24	24	26	48	56	723	136046
8 13	437	246	112	16	3	0	19	20	23	21	33	206	1136	137182
8 14	319	169	56	19	7	1	8	13	21	26	43	158	840	138022
8 15	336	117	49	11	4	0	11	4	5	6	15	87	645	138667
8 16	283	147	45	15	5	3	18	8	2	5	6	49	586	139253
8 17	526	156	32	7	1	1	10	6	6	4	3	21	773	140026
8 18	349	66	22	9	3	2	8	9	4	4	8	13	497	140523
8 19	208	84	34	2	3	2	4	2	2	2	2	3	348	140871

-Continued-

Appendix Table 61. Yentna River (Yentna Station) north bank side-scan sonar counts by sector, 1 July through 8 September 1984 (continued).

DATE	SECTOR												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
8 20	11	0	0	0	0	0	0	0	0	0	0	0	11	140882
8 21	0	0	0	0	0	0	0	0	0	0	0	0	0	140882
8 22	141	99	44	15	18	12	2	4	2	0	24	32	393	141275
8 23	205	232	134	24	8	4	6	7	2	1	12	55	690	141965
8 24	224	150	34	2	2	0	4	0	5	0	12	40	473	142438
8 25	216	110	58	6	4	3	2	7	11	21	28	35	501	142939
8 26	265	166	93	21	4	1	9	5	4	17	21	47	653	143592
8 27	125	131	63	47	29	21	10	13	8	21	30	53	551	144143
8 28	79	41	22	18	16	17	1	0	0	0	10	44	248	144391
8 29	73	21	6	9	5	1	2	4	4	22	97	128	372	144763
8 30	218	35	10	4	2	0	0	2	7	41	91	256	666	145429
8 31	183	22	17	2	0	0	1	0	1	3	20	23	272	145701
9 1	68	18	9	1	0	0	1	3	3	43	8	66	220	145921
9 2	36	10	2	0	0	0	1	4	0	5	8	4	70	145991
9 3	62	7	2	1	0	0	3	3	3	18	6	1	106	146097
9 4	83	8	2	3	0	1	1	2	3	3	0	6	112	146209*
	25707	11454	9985	4668	1747	698	6111	6550	7320	16042	24220	31707	146209*	

* Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 62. Yentna River (Yentna Station) north bank side-scan sonar counts by sector (six-day time periods), 1 July through 8 September 1984 (continued).

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 1- 6	291	24	4	1	0	0	1	2	11	31	70	69	504	504
7 7-12	523	66	20	5	1	1	2	5	6	26	61	195	911	1415
7 13-18	2761	592	373	178	60	11	214	322	456	756	758	947	7428	8843
7 19-24	2496	2627	2283	1002	398	200	2241	2627	3550	7666	11001	12407	48498	57341
7 25-30	5286	2484	3024	1632	515	236	1976	1888	1777	3944	6572	8805	38139	95480
7 31- 5	4580	1977	2230	1187	570	169	1313	1435	1305	3188	5034	7539	30527	126007
8 6-11	5124	1500	1087	395	79	11	211	131	75	142	199	362	9316	135323
8 12-17	2100	984	412	104	30	6	98	75	81	88	148	577	4703	140026
8 18-23	914	481	234	50	32	20	20	22	10	7	46	103	1939	141965
8 24-29	982	619	276	103	60	43	28	29	32	81	198	347	2798	144763
8 30- 4	650	100	42	11	2	1	7	14	17	113	133	356	1446	146209*
TOTAL	25707	11454	9985	4668	1747	698	6111	6550	7320	16042	24220	31707	146209*	

*Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 63. Yentna River (Yentna Station) south bank side-scan sonar counts by sector, 1 July through 8 September 1984.

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 1	19	2	0	0	0	0	0	0	0	0	0	0	21	21
7 2	51	1	0	0	0	0	0	0	0	0	0	0	52	73
7 3	44	8	1	0	0	0	0	0	18	1	61	28	161	234
7 4	59	20	1	0	0	0	0	0	6	0	26	11	123	357
7 5	51	13	3	1	0	0	0	0	0	0	0	0	68	425
7 6	34	8	2	0	0	0	0	0	0	0	0	0	44	469
7 7	21	12	2	0	0	0	0	0	0	4	2	11	52	521
7 8	20	7	1	0	0	0	0	0	0	1	0	0	29	550
7 9	32	22	3	0	0	0	0	1	2	0	0	3	63	613
7 10	87	44	9	0	0	0	0	0	2	1	7	1	151	764
7 11	92	36	13	1	1	0	0	2	0	3	2	14	164	928
7 12	68	26	1	1	0	0	3	1	1	9	15	11	136	1064
7 13	93	21	8	1	0	0	0	2	4	7	1	2	139	1203
7 14	150	57	13	3	3	2	0	3	4	11	13	14	273	1476
7 15	91	56	9	1	0	0	1	4	7	7	3	11	190	1666
7 16	287	96	25	3	0	0	4	1	10	25	15	8	474	2140
7 17	9266	5731	1196	91	2	0	35	31	79	127	117	104	16779	18919
7 18	178	3625	3886	891	213	120	104	83	81	110	72	141	9504	28423
7 19	99	7063	8664	2048	224	12	215	211	198	342	221	255	19552	47975
7 20	2213	10167	8424	1894	265	24	306	254	300	413	311	589	25160	73135
7 21	5633	14916	6113	1083	165	15	245	183	185	313	233	773	29857	102992
7 22	6322	14258	4769	877	178	17	388	336	369	637	548	1807	30506	133498
7 23	4164	13736	6446	1619	440	219	727	570	751	843	618	768	30901	164399
7 24	448	15223	7632	1544	271	36	776	627	994	1120	893	770	30334	194733
7 25	227	10394	5721	729	57	1	187	142	261	297	275	259	18550	213283

-Continued-

Appendix Table 63. Yentna River (Yentna Station) south bank side-scan sonar counts by sector, 1 July through 8 September 1984 (continued).

DATE	SECTOR												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 26	389	6401	7983	761	13	2	30	21	48	144	164	125	16081	229364
7 27	1862	10199	3837	359	10	0	18	15	10	100	88	64	16562	245926
7 28	2268	14605	4680	546	35	3	71	41	26	130	122	121	22648	268574
7 29	3114	19659	6013	505	18	0	35	12	11	66	73	110	29616	298190
7 30	2009	9558	3867	402	25	1	36	11	22	144	74	158	16307	314497
7 31	3235	7510	2987	839	570	547	45	43	46	100	99	276	16297	330794
8 1	2712	6330	3439	655	72	11	192	130	93	318	230	468	14650	345444
8 2	1153	3416	2066	671	216	77	432	344	443	536	462	407	10223	355667
8 3	1278	3642	1911	578	138	32	412	309	386	621	391	460	10158	365825
8 4	2119	4418	1363	245	31	2	85	91	104	158	86	105	8807	374632
8 5	1662	3605	680	51	0	0	3	1	1	11	7	194	6215	380847
8 6	2607	1124	465	372	370	370	0	0	0	19	3	6	5336	386183
8 7	1354	1067	126	2	0	0	0	0	0	0	11	8	2568	388751
8 8	953	1514	231	3	0	0	0	0	1	0	0	12	2714	391465
8 9	459	1471	348	18	0	0	1	0	1	1	2	0	2301	393766
8 10	783	1365	438	57	18	18	9	3	6	15	21	22	2755	396521
8 11	1005	941	268	39	2	0	7	4	3	12	9	7	2297	398818
8 12	568	700	162	34	1	0	5	11	10	41	36	28	1596	400414
8 13	446	525	92	18	5	0	8	14	2	18	33	173	1334	401748
8 14	418	351	108	19	1	0	9	10	6	25	10	12	969	402717
8 15	330	291	57	11	2	0	5	1	3	6	14	16	736	403453
8 16	385	207	23	2	1	0	3	0	0	14	4	10	649	404102
8 17	267	183	30	7	0	0	0	0	0	0	0	2	489	404591
8 18	181	199	23	3	0	0	0	0	0	0	0	2	408	404999
8 19	241	102	4	0	0	0	0	0	0	0	0	0	347	405346

-Continued-

Appendix Table 63. Yentna River (Yentna Station) south bank side-scan sonar counts by sector, 1 July through 8 September 1984 (continued).

DATE	SECTOR												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12		
8 20	160	42	9	0	0	0	0	0	0	0	0	0	211	405557
8 21	176	108	44	9	0	0	0	0	0	0	0	1	338	405895
8 22	202	278	98	11	1	0	7	4	0	3	70	50	724	406619
8 23	376	264	111	21	7	0	3	3	0	1	18	29	833	407452
8 24	380	208	151	15	3	0	10	3	1	1	6	15	793	408245
8 25	248	302	168	23	2	0	0	0	0	0	1	1	745	408990
8 26	222	218	133	30	8	0	0	4	1	2	2	0	620	409610
8 27	375	348	120	53	11	8	6	0	4	1	3	6	935	410545
8 28	395	151	48	5	2	0	3	0	0	4	6	21	635	411180
8 29	378	243	102	16	9	0	2	1	6	16	31	43	847	412027
8 30	185	118	67	16	1	0	13	6	18	37	63	89	613	412640
8 31	166	162	44	10	2	3	11	15	15	38	88	99	653	413293
9 1	143	58	18	6	2	2	3	9	12	16	12	58	339	413632
9 2	82	16	0	0	0	0	2	3	1	6	15	11	136	413768
9 3	53	9	0	0	0	0	1	2	1	19	24	0	109	413877
9 4	49	21	7	0	0	0	1	3	2	16	10	18	127	414004*
TOTAL	65137	197471	95263	17199	3395	1522	4459	3565	4555	6910	5721	8807	414004*	

*Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 64. Yentna River (Yentna Station) south bank side-scan sonar counts by sector (six-day time periods), 1 July through 8 September 1984 (continued).

DATE	S E C T O R												CUMULATIVE	
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7 1- 6	258	52	7	1	0	0	0	0	24	1	87	39	469	469
7 7-12	320	147	29	2	1	0	3	4	5	18	26	40	595	1064
7 13-18	10065	9586	5137	990	218	122	144	124	185	287	221	280	27359	28423
7 19-24	18879	75363	42048	9065	1543	323	2657	2181	2797	3668	2824	4962	166310	194733
7 25-30	9869	70816	32101	3302	158	7	377	242	378	881	796	837	119764	314497
7 31- 5	12159	28921	12446	3039	1027	669	1169	918	1073	1744	1275	1910	66350	380847
8 6-11	7161	7482	1876	491	390	388	17	7	11	47	46	55	17971	398818
8 12-17	2414	2257	472	91	10	0	30	36	21	104	97	241	5773	404591
8 18-23	1336	993	289	44	8	0	10	7	0	4	88	82	2861	407452
8 24-29	1998	1470	722	142	35	8	21	8	12	24	49	86	4575	412027
8 30- 4	678	384	136	32	5	5	31	38	49	132	212	275	1977	414004*
TOTAL	65137	197471	95263	17199	3395	1522	4459	3565	4555	6910	5721	8807	414004*	

*Cumulative total may differ from total fish targets by bank because of method used to average for debris.

Appendix Table 65. Length composition of the major age classes of sockeye salmon collected in the Susitna River at Susitna Station, 1979-1984.

Year	Age Class	Male			Female			Total			Ratio Male-Female
		Average Length (mm) ^{1/}	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	
1979	1.2	464	2.3	312	496	2.8	170	475	1.9	482	1.8:1
1980		509	4.2	104	508	3.3	96	508	---	200	1.1:1
1981		466	5.2	81	482	10.8	51	472	---	132	1.6:1
1982		449	3.8	163	469	7.0	80	456	4.9	249	2.0:1
1983		482	2.9	214	481	2.6	184	482	2.0	393	1.2:1
1984		478	5.2	93	499	4.5	73	487	3.5	166	1.3:1
1979	1.3	574	5.8	78	567	2.1	170	569	2.3	248	0.5:1
1980		577	2.9	131	554	2.3	164	564	---	295	0.8:1
1981		579	2.1	654	562	1.5	711	570	---	1,365	0.9:1
1982		584	2.8	314	562	2.2	389	572	2.5	703	0.8:1
1983		573	3.2	85	556	2.0	93	564	1.9	178	0.9:1
1984		564	6.3	60	549	3.3	74	556	3.4	134	0.8:1
1983	2.2	481	7.0	26	473	6.1	34	477	4.6	60	0.8:1
1984		481	9.3	21	483	7.8	25	482	6.0	46	0.8:1

Appendix Table 65, continued. Length composition of the major age classes of sockeye salmon collected in the Susitna River at Susitna Station, 1979-1984.

Year	Age Class	Male			Female			Total			Ratio Male-Female
		Average Length (mm) ^{1/}	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	
1982	2.3	571	8.6	47	542	5.4	60	559	6.8	107	0.8:1
1984		581	9.2	13	541	7.6	16	559	5.9	29	0.8:1

^{1/} Lengths measured mid-eye to fork of tail.

Appendix Table 66. Weight composition of the major age classes of sockeye salmon collected in the Susitna River at Susitna Station, 1979-1984.

Year	Age Class	Male			Female			Total		
		Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size
1979	1.2	1.7	0.03	311	2.0	0.05	169	1.8	0.03	480
1980		2.2	0.06	152	2.1	0.06	159	2.1	--	311
1981		1.7	0.08	81	2.0	0.08	51	1.8	--	132
1982		1.5	0.05	153	1.6	0.08	80	1.5	0.06	233
1983		1.9	0.04	211	1.7	0.03	182	1.8	0.02	393
1984		1.8	0.06	92	1.9	0.06	73	1.9	0.04	165
1979	1.3	3.4	0.11	78	3.1	0.05	170	3.2	0.05	248
1980		3.3	0.09	82	2.7	0.05	145	2.9	--	227
1981		3.6	0.02	654	3.0	0.02	711	3.3	--	1,365
1982		3.7	0.06	291	3.0	0.04	362	3.3	0.05	653
1983		3.3	0.05	84	2.7	0.04	92	3.0	0.03	176
1984		3.0	0.10	60	2.6	0.05	74	2.8	0.05	134
1983	2.2	1.8	0.09	24	1.7	0.06	34	1.8	0.05	58
1984		1.7	0.09	21	1.8	0.11	24	1.7	0.07	45
1982	2.3	3.5	0.14	44	2.7	0.10	58	3.0	0.11	102
1984		3.2	0.23	13	2.4	0.13	16	2.8	0.12	29

Appendix Table 67. Length composition from pink salmon collected in the Susitna River at Susitna Station, 1976-1984.

Year	Male			Female			Total			Ratio Male-Female
	Average Length (mm) ^{1/}	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	
1976	---	--	---	---	--	---	460	--	630	---
1977	---	--	422	---	--	535	449	0.78	957	0.8:1
1978	---	--	---	---	--	---	451	--	1,242	---
1979	442	2.22	208	435	1.43	283	438	--	491	0.7:1
1980	445	2.53	160	434	2.13	161	439	--	321	1.0:1
1981	444	3.77	72	433	1.75	172	436	--	244	0.4:1
1982	432	3.38	145	413	3.45	163	422	3.42	308	0.9:1
1983	420	2.23	143	417	2.05	172	418	1.51	315	0.8:1
1984	464	3.15	138	436	2.58	136	450	2.04	274	1.0:1

^{1/} Lengths measured mid-eye to fork of tail.

Appendix Table 68. Weight composition from pink salmon collected in the Susitna River at Susitna Station, 1976-1984.

Year	Male			Female			Total		
	Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size
1976	---	--	---	---	--	---	1.5	--	630
1977	---	--	422	---	--	535	1.4	0.01	957
1978	---	--	---	---	--	---	1.4	--	1,242
1979	1.4	0.03	208	1.2	0.01	283	1.3	--	491
1980	1.3	0.03	160	1.2	0.02	161	1.2	--	321
1981	1.4	0.05	72	1.2	0.02	172	1.3	--	244
1982	1.2	0.03	145	1.0	0.02	163	1.1	0.03	308
1983	1.1	0.02	143	1.0	0.02	172	1.1	0.01	315
1984	1.5	0.04	137	1.2	0.03	136	1.4	0.03	273

Appendix Table 69. Length composition from the major age classes of chum salmon collected in the Susitna River at Susitna Station, 1975-1984.

Year	Age Class	Male			Female			Total			Ratio Male-Female
		Average Length (mm) ^{1/}	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	
1976	0.2	---	---	19	---	---	27	552	4.4	46	0.7:1
1978		---	---	72	---	---	109	533	2.2	181	0.7:1
1980		546	9.4	5	528	5.8	22	531	---	27	0.2:1
1984		561	12.2	7	554	11.3	5	558	8.5	12	1.4:1
1975	0.3	---	---	242	---	---	299	584	---	541	0.8:1
1976		---	---	87	---	---	95	608	2.0	182	0.9:1
1977		---	---	446	---	---	356	632	0.9	802	1.3:1
1978		---	---	215	---	---	281	596	1.3	496	0.8:1
1979		578	4.2	104	578	2.1	252	578	---	359	0.4:1
1980		577	12.4	11	574	6.3	24	575	---	35	0.5:1
1981		579	12.1	52	579	3.7	88	579	---	140	0.6:1
1982		604	3.1	116	593	2.1	167	597	2.5	283	0.7:1
1983		591	6.7	22	568	11.4	43	576	7.9	65	0.4:1
1984		597	3.8	60	594	3.1	101	595	2.4	161	0.6:1

-Continued-

Appendix Table 69. Length composition from the major age classes of chum salmon collected in the Susitna River at Susitna Station, 1975-1984 (continued).

Year	Age Class	Male			Female			Total			Ratio Male-Female
		Average Length (mm) ^{1/}	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	
1976	0.4	---	---	16	---	---	23	636	4.3	39	0.7:1
1978		---	---	143	---	---	132	627	1.4	275	1.1:1
1980		581	8.0	5	618	14.5	4	597	---	9	1.3:1
1982		629	8.3	14	612	4.5	25	618	5.8	39	0.6:1
1983		619	9.3	14	598	4.7	39	604	4.2	53	0.4:1
1984		626	8.2	14	612	6.7	14	619	5.5	28	1.0:1

^{1/} Lengths measured mid-eye to fork of tail.

Appendix Table 70. Weight composition from the major age classes of chum salmon collected in the Susitna River at Susitna Station, 1980-1984.

Year	Age Class	Male			Female			Total		
		Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size
1980	0.2	2.5	0.18	5	2.2	0.09	22	2.3	--	27
1984		2.8	0.25	7	2.6	0.21	5	2.7	0.17	12
1980	0.3	3.1	0.21	11	3.0	0.14	24	3.0	--	35
1981		3.6	0.08	52	3.3	0.07	88	3.4	--	140
1982		3.9	0.07	99	3.6	0.04	160	3.7	0.05	259
1983		3.6	0.15	18	3.1	0.10	42	3.3	0.08	60
1984		3.4	0.08	59	3.2	0.06	101	3.3	0.05	160
1980	0.4	3.8	0.36	5	3.8	0.35	4	3.8	--	9
1982		4.6	0.21	13	3.7	0.12	25	4.0	0.15	38
1983		4.3	0.20	14	3.5	0.10	37	3.7	0.09	51
1984		3.9	0.20	14	3.5	0.23	14	3.7	0.15	28

Appendix Table 71. Length composition from the major age classes of coho salmon collected in the Susitna River, 1976-1984.

Year	Age Class	Male			Female			Total			Ratio Male-Female
		Average Length (mm) ^{1/}	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	Average Length (mm)	Standard Error	Sample Size	
1977	1.1	---	---	64	---	---	31	472	5.6	95	2.1:1
1978		---	---	117	---	---	100	488	3.3	217	1.2:1
1979		449	13.0	33	494	11.1	23	458	---	62	1.7:1
1980		452	10.8	23	476	7.7	36	467	---	59	0.6:1
1981		450	12.6	10	489	11.5	19	476	---	29	0.5:1
1982		553	10.2	25	519	7.5	42	531	8.5	67	0.6:1
1983		499	12.6	16	486	9.0	32	490	7.3	48	0.5:1
1984		540	33.6	9	509	18.0	14	521	17.1	23	0.6:1
1976	2.1	---	---	171	---	---	220	534	2.2	391	0.8:1
1977		---	---	613	---	---	406	519	2.4	519	1.5:1
1978		---	---	321	---	---	240	523	1.9	561	1.3:1
1979		502	7.7	96	528	6.9	121	516	---	217	0.8:1
1980		515	7.0	72	515	3.1	173	515	---	245	0.4:1
1981		524	8.4	81	529	5.0	99	527	---	180	0.8:1
1982		556	5.3	87	542	4.5	137	547	4.8	227	0.6:1
1983		534	6.2	47	523	5.1	74	527	3.9	121	0.6:1
1984		567	12.4	16	546	10.8	35	553	8.4	51	0.5:1

-195-

^{1/} Lengths measured from mid-eye to fork of tail.

Appendix Table 72. Weight composition from the major age classes of coho salmon collected in the Susitna River, 1979-1984.

Year	Age Class	Male			Female			Total		
		Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size	Average Weight (kg)	Standard Error	Sample Size
1979	1.1	1.5	0.11	38	1.8	0.10	23	1.6	--	62
1980		1.5	0.10	23	1.8	0.10	36	1.7	--	59
1981		1.5	0.16	10	2.0	0.18	19	1.8	--	29
1982		2.9	0.17	25	2.3	0.11	42	2.5	0.13	67
1983		2.2	0.20	16	2.1	0.14	31	2.1	0.12	47
1984		3.0	0.34	9	2.3	0.28	14	2.6	0.22	23
1979	2.1	2.4	0.08	96	2.5	0.01	121	2.5	--	217
1980		2.3	0.09	72	2.2	0.05	173	2.2	--	245
1981		2.7	0.11	81	2.7	0.08	99	2.7	--	180
1982		3.0	0.09	87	2.7	0.07	137	2.8	0.08	224
1983		2.7	0.11	44	2.5	0.07	71	2.5	0.06	115
1984		3.1	0.23	16	2.5	0.12	35	2.7	0.11	51

Appendix Table 73. Fish Creek (Big Lake) weir counts by date and species, 29 June through 19 September 1984 1/.

Date	Sockeye	Cum	Pink	Cum	Coho	Cum
6/29	100	100				
6/30	0	100				
7/01	0	100				
7/02	32	132				
7/03	45	177				
7/04	23	200				
7/05	0	200				
7/06	0	200				
7/07	0	200				
7/08	24	224				
7/09	5	229				
7/10	6	235				
7/11	510	745				
7/12	414	1,159				
7/13	1,310	2,469				
7/14	1,947	4,416				
7/15	1,260	5,676				
7/16	571	6,247				
7/17	0	6,247				
7/18	8,740	14,987			1	1
7/19	9,593	24,580			7	8
7/20	11,162	35,742			2	10
7/21	4,927	40,669			0	10
7/22	13,027	53,696			0	10
7/23	11,349	65,045	3	3	46	56
7/24	16,143	81,188	5	8	59	115
7/25	27,397	108,585	30	38	61	176
7/26	11,141	119,726	2	40	41	217
7/27	14,461	134,187	16	56	93	310
7/28	9,092	143,279	6	62	42	352
7/29	3,350	146,629	6	68	9	361
7/30	476	147,105	0	68	12	373
7/31	6,672	153,777	42	110	134	507
8/01	6,357	160,134	83	193	74	581
8/02	5,130	165,264	36	229	35	616
8/03	2,292	167,556	21	250	27	643
8/04	1,346	168,902	33	283	7	650
8/05	352	169,254	18	301	0	650
8/06	1,820	171,074	17	318	12	662
8/07	2,088	173,162	33	351	35	697

-Continued-

Appendix Table 73. Fish Creek (Big Lake) weir counts by date and species, 29 June through 19 September, 1984 ^{1/} (continued).

Date	Sockeye	Cum	Pink	Cum	Coho	Cum
8/08	5,161	178,323	191	542	18	715
8/09	1,363	179,686	47	589	8	723
8/10	370	180,056	7	596	1	724
8/11	822	180,878	31	627	6	730
8/12	23	180,901	22	649	2	732
8/13	878	181,779	72	721	7	739
8/14	663	182,442	37	758	13	752
8/15	1,166	183,608	29	787	32	784
8/16	680	184,288	18	805	33	817
8/17	108	184,396	5	810	3	820
8/18	320	184,716	4	814	5	825
8/19	587	185,303	8	822	5	830
8/20	125	185,428	0	822	1	831
8/21	1,126	186,554	3	825	6	837
8/22	240	186,794	0	825	3	840
8/23	123	186,917	3	828	13	853
8/24	2,009	188,926	0	828	201	1,054
8/25	1,692	190,618	1	829	330	1,384
8/26	595	191,213	0	829	186	1,570
8/27	122	191,335	0	829	37	1,607
8/28	40	191,375	0	829	10	1,617
8/29	60	191,435	0	829	16	1,633
8/30	60	191,495	0	829	16	1,649
8/31	30	191,525	1	830	10	1,659
9/01	236	191,761			22	1,681
9/02	158	191,919			3	1,684
9/03	103	192,022			15	1,699
9/04	28	192,050			40	1,739
9/05	52	192,102			42	1,781
9/06	56	192,158			81	1,862
9/07	65	192,223			54	1,916
9/08	22	192,245			80	1,996
9/09	27	192,272			51	2,047
9/10	38	192,310			160	2,207
9/11	18	192,328			54	2,261
9/12	2	192,330			63	2,324
9/13	6	192,336			95	2,419
9/14	3	192,339			138	2,557
9/15	2	192,341			101	2,658
9/16	2	192,343			58	2,716

-Continued-

Appendix Table 73. Fish Creek (Big Lake) weir counts by date and species, 29 June through 19 September, 1984 ^{1/} (continued).

Date	Sockeye	Cum	Pink	Cum	Coho	Cum
9/17	3	192,346			71	2,787
9/18	4	192,350			83	2,870
9/19	2	192,352			10	2,880
<hr/>						
Total ^{2/}	192,352		830		2,880	
					4,510 ^{3/}	

^{1/} Chlupach, pers. comm.

^{2/} 2,359 sockeye salmon and 49 coho salmon precocial males are not included in totals.

^{3/} An additional 1,630 coho salmon were counted by stream survey below the weir.

Appendix Table 74. Fish Creek (Big Lake) escapement of sockeye salmon, age, length (mm) and weight (kg) by sex, 1984.

	AGE GROUP							TOTAL
	1.1	1.2	2.1	1.3	2.2	2.3	3.2	
MALES								
PERCENT	.60	31.70	.40	2.60	3.40	.40	.10	39.20
AV LENGTH	374.50	490.29	379.00	565.37	517.47	586.33	465.00	495.63
STD ERROR	3.17	1.93	11.81	7.49	7.71	10.09	0.00	1.78
SAMP SIZE	8	424	5	35	45	6	1	524
AV WEIGHT	.75	1.73	.70	2.53	2.10	2.87	1.40	1.80
STD ERROR	.04	.03	.08	.10	.10	.15	0.00	.02
SAMP SIZE	8	424	5	35	45	6	1	524
FEMALES								
PERCENT	.10	52.50	.30	3.10	4.30	.40	.10	60.80
AV LENGTH	357.50	500.52	426.25	541.22	512.91	556.60	525.00	503.28
STD ERROR	7.50	1.12	31.05	6.94	4.05	19.48	0.00	1.09
SAMP SIZE	2	703	4	41	58	5	1	814
AV WEIGHT	.65	1.74	1.12	2.18	1.82	2.24	1.90	1.77
STD ERROR	.05	.02	.23	.08	.05	.21	0.00	.02
SAMP SIZE	2	703	4	41	58	5	1	814
SEXES COMBINED								
PERCENT	.70	84.20	.70	5.70	7.70	.80	.20	100.00
AV LENGTH	372.07	496.67	399.25	552.24	514.92	571.46	495.00	500.28
STD ERROR	2.95	1.01	15.28	5.09	4.07	10.43	0.00	.96
SAMP SIZE	10	1,127	9	76	103	11	2	1,338
AV WEIGHT	.74	1.74	.88	2.34	1.94	2.56	1.65	1.78
STD ERROR	.04	.02	.11	.07	.05	.12	0.00	.01
SAMP SIZE	10	1,127	9	76	103	11	2	1,338

Because the Alaska Department of Fish and Game receives federal funding, all of its public programs and activities are operated free from discrimination on the basis of race, color, national origin, age, or handicap. Any person who believes he or she has been discriminated against should write to:

O.E.O.
U.S. Department of the Interior
Washington, D.C. 20240